



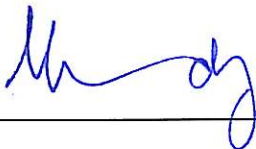
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# AIRPLANE FLIGHT MANUAL

## DA 42 NG

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**Airworthiness Category** : Normal  
**Requirement** : JAR-23  
**Serial Number** : \_\_\_\_\_  
**Registration** : \_\_\_\_\_  
**Doc. No.** : 7.01.15-E  
**Date of Issue** : 18-Feb-2009

Signature :   
EASA Project Manager : HARRY  
Stamp :   
Date of approval : 30 APRIL 2009  
(EASA app. date)

This Airplane Flight Manual is approved with EASA approval no. EASA.A.C. 09012

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DIAMOND AIRCRAFT INDUSTRIES GMBH  
N.A. OTTO-STR. 5  
A-2700 WIENER NEUSTADT  
AUSTRIA

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**FOREWORD**

We congratulate you on the acquisition of your new DIAMOND DA 42 NG.

Skillful operation of an airplane increases both safety and the enjoyment of flying. Please take the time therefore, to familiarize yourself with your new DIAMOND DA 42 NG.

This airplane may only be operated in accordance with the procedures and operating limitations of this Airplane Flight Manual.

Before this airplane is operated for the first time, the pilot must familiarize himself with the complete contents of this Airplane Flight Manual.

In the event that you have obtained your DIAMOND DA 42 NG second-hand, please let us know your address, so that we can supply you with the publications necessary for the safe operation of your airplane.

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## **0.1 APPROVAL**

The content of approved chapters is approved by EASA. All other content is approved by DAI under the authority of EASA DOA No. EASA.21J.052 in accordance with Part 21.

## **0.2 RECORD OF REVISIONS**

All revisions of this manual, with the exception of -

- Temporary Revisions,
- updates of the modification level (Section 1.1),
- updated mass and balance information (Section 6.3),
- updates of the Equipment Inventory (Section 6.5), and
- updates of the List of Supplements (Section 9.2)

must be recorded in the following table.

The new or amended text is indicated by a vertical black line at the left hand side of the revised page, with the revision number and date appearing at the bottom of the page.

If pages are revised which contain information valid for your particular serial number (modification level of the airplane, weighing data, Equipment Inventory, List of Supplements), then this information must be transferred to the new pages in hand-writing.

Temporary Revisions, if applicable, are inserted behind the cover page of this manual. Temporary Revisions are used to provide information on systems or equipment until the next 'permanent' Revision of the Airplane Flight Manual. When a 'permanent' Revision covers a Mandatory or Optional Design Change Advisory (MÄM or OÄM), then the corresponding Temporary Revision is superseded. For example: If Revision 5 covers OÄM 42-039, then the Temporary Revision TR OÄM-42-039 is superseded by the 'permanent' Revision 5.

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# CHAPTER 1

## GENERAL

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## 1.1 INTRODUCTION

This Airplane Flight Manual has been prepared in order to provide pilots and instructors with all the information required for the safe and efficient operation of the airplane.

The Airplane Flight Manual includes all the data which must be made available to the pilot according to the JAR-23 requirement. Beyond this, it contains further data and operating instructions which, in the manufacturer's opinion, could be of value to the pilot.

Equipment and modification level (design details) of the airplane may vary from serial number to serial number. Therefore, some of the information contained in this manual is applicable depending on the respective equipment and modification level. The exact equipment of your serial number is recorded in the Equipment Inventory in Section 6.5. The modification level is recorded in the following table (as far as necessary for this manual).

Modification	Source	Installed	
Ice Protection System	OÄM 42-053	<input type="checkbox"/> yes	<input type="checkbox"/> no
Oxygen System	OÄM 42-055	<input type="checkbox"/> yes	<input type="checkbox"/> no
Auxiliary Fuel Tanks	OÄM 42-056	<input type="checkbox"/> yes	<input type="checkbox"/> no
Front Seats with Adjustable Backrest	OÄM 42-067	<input type="checkbox"/> yes	<input type="checkbox"/> no
Electrical Rudder Pedal Adjustment	OÄM 42-070	<input type="checkbox"/> yes	<input type="checkbox"/> no
Sun Visors	OÄM 42-101	<input type="checkbox"/> yes	<input type="checkbox"/> no

This Airplane Flight Manual must be kept on board the airplane at all times. Its designated place is the side bag of the forward left seat. The designated place for the Garmin G1000 Cockpit Reference Guide is the bag on the rear side of the forward left seat.

### CAUTION

The DA 42 NG is a twin engine airplane. When the operating limitations and maintenance requirements are complied with, it has the high degree of reliability which is required by the certification basis. Nevertheless, an engine failure is not completely impossible. For this reason it is highly recommended for flights during the night, on top, under IMC, or above terrain which is unsuitable for a landing, to select flight times and flight routes such that reduced performance in case of single engine operation does not constitute a risk.

## 1.2 CERTIFICATION BASIS

The certification basis is JAR-23, published on 11-Mar-1994, including Amdt. 1, and additional requirements as laid down in CRI A-01.

## 1.3 WARNINGS, CAUTIONS AND NOTES

Special statements in the Airplane Flight Manual concerning the safety or operation of the airplane are highlighted by being prefixed by one of the following terms:

### **WARNING**

means that the non-observation of the corresponding procedure leads to an immediate or important degradation in flight safety.

### **CAUTION**

means that the non-observation of the corresponding procedure leads to a minor or to a more or less long term degradation in flight safety.

### **NOTE**

draws the attention to any special item not directly related to safety but which is important or unusual.

## 1.4 DIMENSIONS

### NOTE

All dimensions shown below are approximate.

#### Overall Dimensions

Span	: 13.42 m	44 ft
	: 13.55 m	44.5 ft including ACL
Length	: 8.56 m	28 ft 1 in
Height	: 2.49 m	8 ft 2 in

#### Wing

Airfoil	: Wortmann FX 63-137/20 - W4	
Wing Area	: 16.29 m <sup>2</sup>	175.3 sq.ft.
Mean aerodynamic chord	: 1.271 m	4 ft 2 in
Aspect ratio	: 11.06	
Dihedral	: 5°	
Leading edge sweep	: 1°	

#### Aileron

Area (total, left + right)	: 0.66 m <sup>2</sup>	7.1 sq.ft.
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Wing Flaps

Area (total, left + right) : 2.18 m<sup>2</sup> 23.5 sq.ft.

Horizontal Tail

Area : 2.35 m<sup>2</sup> 25.3 sq.ft.

Elevator area : 0.66 m<sup>2</sup> 7.1 sq.ft.

Angle of incidence : -1.1° relative to longitudinal axis of airplane

Vertical Tail

Area : 2.43 m<sup>2</sup> 26.2 sq.ft.

Rudder area : 0.78 m<sup>2</sup> 8.4 sq.ft.

Landing Gear

Track : 2.95 m (9 ft 8 in)

Wheelbase : 1.735 m (5 ft 8 in)

Nose wheel : 5.00-5; 10 PR, 120 mph

Main wheel : 15x6.0-6; 6 PR, 120 mph

## 1.5 DEFINITIONS AND ABBREVIATIONS

### (a) Airspeeds

CAS: Calibrated Airspeed. Indicated airspeed, corrected for installation and instrument errors. CAS equals TAS at standard atmospheric conditions (ISA) at MSL.

IAS: Indicated Airspeed as shown on an airspeed indicator.

KCAS: CAS in knots.

KIAS: IAS in knots.

TAS: True Airspeed. The speed of the airplane relative to the air. TAS is CAS corrected for errors due to altitude and temperature.

$V_O$ : Operating Maneuvering Speed. Full or abrupt control surface movement is not permissible above this speed.

$V_{FE}$ : Maximum Flaps Extended Speed. This speed must not be exceeded with the given flap setting.

$V_{LE}$ : Maximum Landing Gear Extended Speed. This speed may not be exceeded if the landing gear is extended.

$V_{LOE}$ : Maximum Landing Gear Operating Speed for Extension. This speed may not be exceeded during the extension of the landing gear.

$V_{LOR}$ : Maximum Landing Gear Operating Speed for Retraction. This speed may not be exceeded during the retraction of the landing gear.

$V_{MC}$ : Minimum Control Speed. Minimum speed necessary to be able to control the airplane in case of one engine inoperative.

$V_{NE}$ : Never Exceed Speed in smooth air. This speed must not be exceeded in any operation.

- $V_{NO}$ : Maximum Structural Cruising Speed. This speed may be exceeded only in smooth air, and then only with caution.
- $V_S$ : Stalling Speed, or the minimum continuous speed at which the airplane is still controllable in the given configuration.
- $V_{S0}$ : Stalling Speed, or the minimum continuous speed at which the airplane is still controllable in the landing configuration.
- $V_{S1}$ : Stalling Speed, or the minimum continuous speed at which the airplane is still controllable with flaps and landing gear retracted.
- $V_{SSE}$ : Minimum Control Speed for Schooling. Minimum speed necessary in case of one engine intentionally inoperative / idle (training purposes).
- $V_x$ : Best Angle-of-Climb Speed.
- $V_y$ : Best Rate-of-Climb Speed.
- $V_{YSE}$ : Best Rate of-Climb Speed for one engine inoperative.

(b) Meteorological Terms

- ISA: International Standard Atmosphere. Conditions at which air is identified as an ideal dry gas. The temperature at mean sea level is 15 °C (59 °F), air pressure at MSL is 1013.25 hPa (29.92 inHg); the temperature gradient up to the altitude at which the temperature reaches -56.5 °C (-69.7 °F) is -0.0065 °C/m (-0.00357 °F/ft), and above this 0 °C/m (0 °F/ft).
- MSL: Mean Sea Level.
- OAT: Outside Air Temperature.



**QNH:** Theoretical atmospheric pressure at MSL, calculated from the elevation of the measuring point above MSL and the actual atmospheric pressure at the measuring point.

**Density Altitude:**

Altitude in ISA conditions at which the air density is equal to the current air density.

**Indicated Pressure Altitude:**

Altitude reading with altimeter set to 1013.25 hPa (29.92 inHg).

**Pressure Altitude:**

Altitude indicated by a barometric altimeter, which is set to 1013.25 hPa (29.92 inHg). The Pressure Altitude is the Indicated Pressure Altitude corrected for installation and instrument errors.

In this Airplane Flight Manual altimeter instrument errors are regarded as zero.

**Wind:**

The wind speeds which are shown as variables in the diagrams in this manual should be regarded as headwind or tailwind components of the measured wind.

### (c) Flight Performance and Flight Planning

**AGL:** Above Ground Level.

**Demonstrated Crosswind Component:**

The speed of the crosswind component at which adequate maneuverability for take-off and landing has been demonstrated during type certification.

MET: Weather, weather advice.

NAV: Navigation, route planning.

RoC: Rate of Climb.

(d) Mass and Balance

CG: Center of Gravity, also called 'center of mass'. Imaginary point in which the airplane mass is assumed to be concentrated for mass and balance calculations. Its distance from the Datum Plane is equal to the Center of Gravity Moment Arm.

Center of Gravity Moment Arm:

The Moment Arm which is obtained if one divides the sum of the individual moments of the airplane by its total mass.

Center of Gravity Limits:

The Center of Gravity range within which the airplane, at a given mass, must be operated.

DP: Datum Plane; an imaginary vertical plane from which all horizontal distances for center of gravity calculations are measured.

Empty Mass: The mass of the airplane including unusable fuel, all operating fluids and the maximum quantity of oil.

Maximum Take-off Mass:

The maximum permissible mass for take-off.

**Maximum Landing Mass:**

The highest mass for landing conditions at the maximum descent velocity. This velocity was used in the strength calculations to determine the landing gear loads during a particularly hard landing.

**Moment Arm:** The horizontal distance from the Datum Plane to the Center of Gravity of a component.

**Moment:** The mass of a component multiplied by its moment arm.

**Usable fuel:** The quantity of fuel available for flight planning.

**Unusable fuel:** The quantity of fuel remaining in the tank which cannot be used for flight.

**Useful load:** The difference between take-off mass and empty mass.

**(e) Engine**

**EECU:** Electr. Engine Control Unit

**RPM:** Revolutions per minute (rotational speed of the propeller)

**Engine starting fuel temperature:**

Above this fuel temperature the engine may be started.

**Take-off fuel temperature:**

Above this fuel temperature take-off power setting is permitted.

**OEI:** One engine inoperative

(f) Designation of the Circuit Breakers on the Instrument Panel*LH MAIN BUS:*

COM1	COM Radio No. 1
GPS/NAV1	Global Positioning System and NAV Receiver No. 1
XPDR	Transponder
ENG INST	Engine Instruments
PITOT	Pitot Heating System
XFER PUMP/DE-ICE	Aux Fuel Pump / De-Icing System
TAXI/MAP/ACL	Taxi-, Map-, Anti Collision Light
FLOOD	Flood Light
PFD	Primary Flight Display
ADC	Air Data Computer
AHRS	Attitude Heading Reference System
GEAR WRN/ELEV. LIMIT	Landing Gear Annunciation / Variable Elevator Stop
GEAR	Landing Gear Control

*RH MAIN BUS:*

MFD	Multi Function Display
AH	Artificial Horizon
STALL WRN	Stall Warning System
FLAP	Flap System
LDG LT/START	Landing Light / Start
INST LT/ NAV LT	Instrument-, Navigation (Position) Light
AV/CDU/FAN	Avionic-, CDU-Cooling Fans
AVIONIC BUS	Avionic Bus
AV CONT./AP. WRN.	Avionic Control / Autopilot Warning (not used)

*AVIONICS BUS:*

COM2	COM Radio No. 2
GPS/NAV2	Global Positioning System and NAV Receiver No. 2
AUDIO	Audio Panel
AUTO PILOT	Auto Pilot System
Wx 500	Stormscope
ADF	Automatic Direction Finder
DME	Distance Measuring Equipment
Wx RDR	Weather Radar
TAS	Traffic Advisory System
DATA LINK	GDL 69A Data Link System

*LH ENG ECU BUS:*

ECU BUS	LH ECU Bus
ECU B	LH ECU B
ECU A	LH ECU A

*LH BUS:*

ALT.LH	LH Alternator
BATT	Battery

*LH ECU BUS:*

ECU A	LH ECU A
ECU B	LH ECU B

*FUEL PUMPS LH ENGINE:*

FUEL PUMP A	LH ECU A Fuel Pump
FUEL PUMP B	LH ECU B Fuel Pump

*RH ENG ECU BUS:*

ECU BUS	RH ECU Bus
ECU B	RH ECU B
ECU A	RH ECU A

*RH BUS:*

ALT.RH	RH Alternator
BATT	Battery

*RH ECU BUS:*

ECU A	RH ECU A
ECU B	RH ECU B

*FUEL PUMPS RH ENGINE:*

FUEL PUMP A	RH ECU A Fuel Pump
FUEL PUMP B	RH ECU B Fuel Pump

(g) Equipment

ELT: Emergency Locator Transmitter

(h) Design Change Advisories

MÄM: Mandatory Design Change Advisory

OÄM: Optional Design Change Advisory

VÄM: Variant Design Change Advisory

(i) Miscellaneous

ACG: Austro Control GmbH (Austrian Airworthiness Authority)

ATC: Air Traffic Control

CFRP: Carbon Fiber Reinforced Plastic

EASA: European Aviation Safety Agency

EPU: External Power Unit

GIA: Garmin Integrated Avionics

GFRP: Glass Fiber Reinforced Plastic

JAR: Joint Aviation Requirements

JC/VP: Joint Certification/Validation Procedure

PCA: Primary Certification Authority

## 1.6 UNITS OF MEASUREMENT

### 1.6.1 CONVERSION FACTORS

Dimension	SI-Units	US Units	Conversion
Length	[mm] millimeters	[in] inches	$[mm] / 25.4 = [in]$
	[m] meters	[ft] feet	$[m] / 0.3048 = [ft]$
	[km] kilometers	[NM] nautical miles	$[km] / 1.852 = [NM]$
Volume	[l] liters	[US gal] US gallons	$[l] / 3.7854 = [US\ gal]$
		[qts] US quarts	$[l] / 0.9464 = [qts]$
Speed	[km/h] kilometers per hour	[kts] knots	$[km/h] / 1.852 = [kts]$
	[m/s] meters per second	[mph] miles per hour	$[km/h] / 1.609 = [mph]$
		[fpm] feet per minute	$[m/s] \times 196.85 = [fpm]$
Speed of rotation	[RPM] revolutions per minute		--
Mass	[kg] kilograms	[lb] pounds	$[kg] \times 2.2046 = [lb]$
Force, weight	[N] newtons	[lbf] pounds force	$[N] \times 0.2248 = [lbf]$
Pressure	[hPa] hecto-pascals	[inHg] inches of mercury	$[hPa] = [mbar]$
	[mbar] millibars	[psi] pounds per square inch	$[hPa] / 33.86 = [inHg]$
	[bar] bars		$[bar] \times 14.504 = [psi]$
Temperature	[°C] degrees Celsius	[°F] degrees Fahrenheit	$[°C] \times 1.8 + 32 = [°F]$ $([°F] - 32) / 1.8 = [°C]$



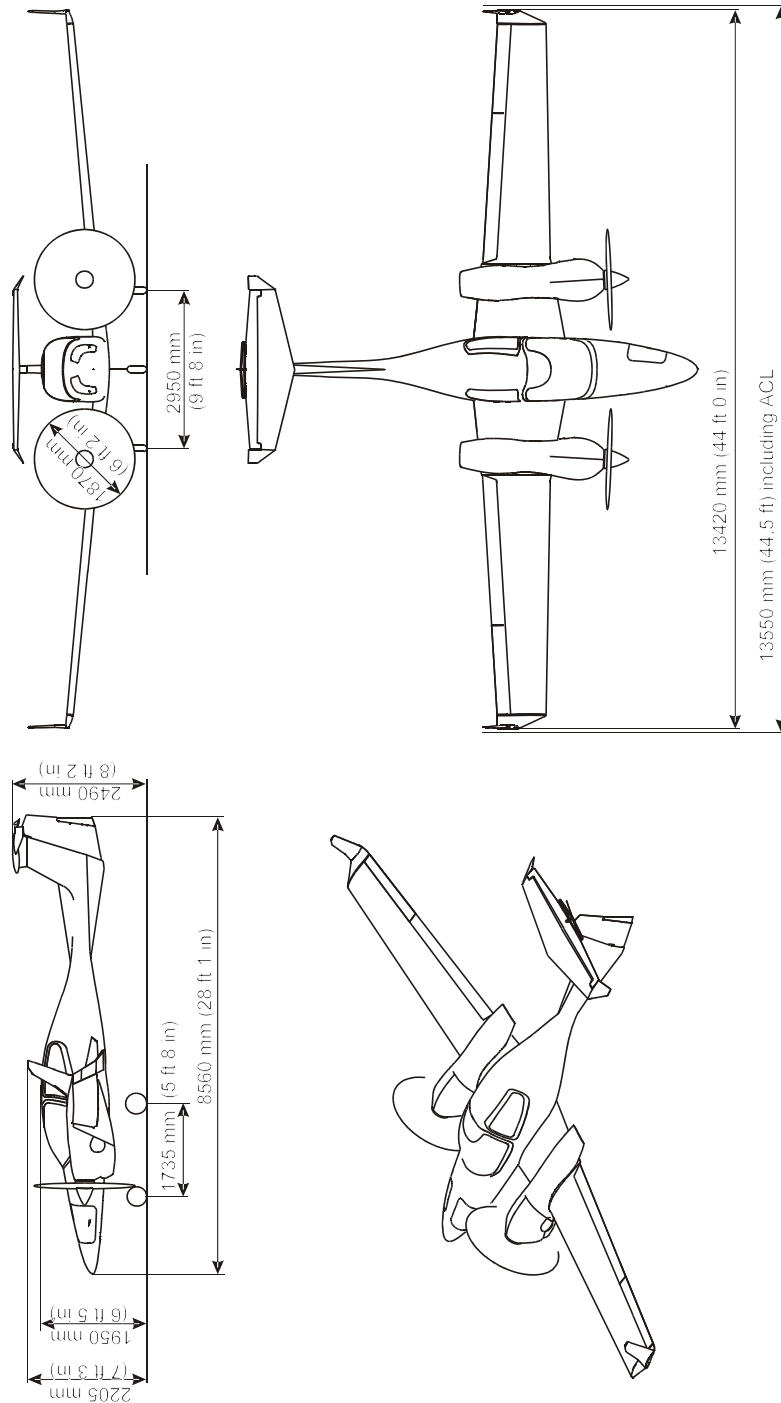
Dimension	SI-Units	US Units	Conversion
Intensity of electric current	[A] ampères		--
Electric charge (battery capacity)	[Ah] ampère-hours		--
Electric potential	[V] volts		--
Time	[sec] seconds		--

**1.6.2 CONVERSION CHART LITERS / US GALLONS**

Liters	US Gallons
5	1.3
10	2.6
15	4.0
20	5.3
25	6.6
30	7.9
35	9.2
40	10.6
45	11.9
50	13.2
60	15.9
70	18.5
80	21.1
90	23.8
100	26.4
110	29.1
120	31.7
130	34.3
140	37.0
150	39.6
160	42.3
170	44.9
180	47.6

US Gallons	Liters
1	3.8
2	7.6
4	15.1
6	22.7
8	30.3
10	37.9
12	45.4
14	53.0
16	60.6
18	68.1
20	75.7
22	83.3
24	90.9
26	98.4
28	106.0
30	113.6
32	121.1
34	128.7
36	136.3
38	143.8
40	151.4
45	170.3
50	189.3

**1.7 THREE-VIEW DRAWING**



## **1.8 G1000 AVIONICS SYSTEM**

1. The G1000 Integrated Avionics System is a fully integrated flight, engine, communication, navigation and surveillance instrumentation system. The system consists of a Primary Flight Display (PFD), Multi-Function Display (MFD), audio panel, Air Data Computer (ADC), Attitude and Heading Reference System (AHRS), engine sensors and processing unit (GEA), and integrated avionics (GIA) containing VHF communications, VHF navigation, and GPS (Global Positioning System).
2. The primary function of the PFD is to provide attitude, heading, air data, navigation, and alerting information to the pilot. The PFD may also be used for flight planning. The primary function of the MFD is to provide engine information, mapping, terrain information, autopilot operation, and for flight planning. The audio panel is used for selection of radios for transmitting and listening, intercom functions, and marker beacon functions.
3. The primary function of the VHF Communication portion of the G1000 is to enable external radio communication. The primary function of the VOR/ILS Receiver portion of the equipment is to receive and demodulate VOR, Localizer, and Glide Slope signals. The primary function of the GPS portion of the system is to acquire signals from the GPS satellites, recover orbital data, make range and Doppler measurements, and process this information in real-time to obtain the user's position, velocity, and time.
4. Provided a Garmin G1000 GPS receiver is receiving adequate usable signals, it has been demonstrated capable of and has been shown to meet the accuracy specifications for:
  - (a) VFR/IFR enroute, oceanic, terminal, and non-precision instrument approach (GPS, Loran-C, VOR, VOR-DME, TACAN, NDB, NDB-DME, RNAV) operation within the U.S. National Airspace System in accordance with AC 20-138A.

(b) RNAV (GPS) Approaches - The G1000 GPS meets the requirements of AC 20-138(A) for GPS based RNAV approaches. This includes RNAV approaches labeled as RNAV (GPS), provided GPS sensor data is valid.

(c) The system meets the accuracy of RNP5 airspace (BRNAV) requirements of AC 90-96 and in accordance with AC 20-138A, EASA AMC 20-4, and FAA Order 8110.60 for oceanic and remote airspace operations, provided it is receiving usable navigation information from the GPS receiver.

Navigation is accomplished using the WGS-84 (NAD-83) coordinate reference datum. GPS navigation data is based upon use of only the GPS operated by the United States of America.

## **1.9 SOURCE DOCUMENTATION**

This section lists documents, manuals and other literature that were used as sources for the Airplane Flight Manual, and indicates the respective publisher. However, only the information given in the Airplane Flight Manual is valid.

### **1.9.1 ENGINE**

Address: Austro Engine GmbH  
Rudolf Diesel-Str. 11  
A-2700 Wiener Neustadt  
AUSTRIA

Phone: +43-2622-23 000  
Fax: +43-2622-23 000 - 2711  
Internet: [www.austroengine.at](http://www.austroengine.at)

Documents: Operation Manual,  
E4.01.01 Rev. 1 or later

Engine TC-Holder: Diamond Aircraft Industries GmbH  
N.A. Otto-Straße 5  
A-2700 Wiener Neustadt  
AUSTRIA

**1.9.2 PROPELLER**

Address: mt-propeller  
Airport Straubing Wallmühle  
D-94348 Atting  
GERMANY

Phone: +49-9429-9409-0  
E-mail: sales@mt-propeller.com  
Website: www.mt-propeller.de

Documents: E-124, Operation and Installation Manual  
Hydraulically controlled variable pitch propeller  
MTV -5, -6, -9, -11, -12, -14, -15, -16, -21, -22, -25

**1.9.3 AVIONICS SYSTEM**

Address: Garmin International, Inc.  
1200 East 151<sup>st</sup> Street  
Olathe, Kansas 66062  
USA

Phone: +1-(913)-3978200  
Fax: +1-(913)-3978282  
Website: www.garmin.com

Documents: G1000 Cockpit Reference Guide  
P/N 190-00963-00, latest revision  
  
G1000 Pilot's Guide  
P/N 190-00962-00, latest revision

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## CHAPTER 2

# OPERATING LIMITATIONS

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## **2.1 INTRODUCTION**

Chapter 2 of this Airplane Flight Manual provides operating limitations, instrument markings and placards necessary for the safe operation of the airplane, its powerplants, standard systems and standard equipment.

The limitations included in this Chapter are approved.

### **WARNING**

Operation of the airplane outside of the approved operating limitations is not permissible.

**2.2 AIRSPEED**

	Airspeed		KIAS	Remarks
V <sub>O</sub>	Operating maneuvering speed	above 1800 kg (3968 lb)	122 KIAS	Do not make full or abrupt control surface movement above this speed.
		above 1700 kg (3748 lb) to 1800 kg (3968 lb)	119 KIAS	
		up to 1700 kg (3748 lb)	112 KIAS	
V <sub>FE</sub>	Max. flaps extended speed	LDG	113 KIAS	Do not exceed these speeds with the given flap setting.
		APP	133 KIAS	
V <sub>LO</sub>	Max. landing gear operating speed	Extension v <sub>LOE</sub>	188 KIAS	Do not operate the landing gear above this speed.
		Retraction v <sub>LOR</sub>	152 KIAS	
V <sub>LE</sub>	Max. landing gear extended speed		188 KIAS	Do not exceed this speed with the landing gear extended.
V <sub>MCA</sub>	Minimum control speed airborne		76 KIAS	With one engine inoperative, keep airspeed above this limit.
V <sub>NO</sub>	Max. structural cruising speed		151 KIAS	Do not exceed this speed except in smooth air, and then only with caution.
V <sub>NE</sub>	Never exceed speed in smooth air		188 KIAS	Do not exceed this speed in any operation.

### 2.3 AIRSPEED INDICATOR MARKINGS

Marking	KIAS	Significance
White arc	62 - 113 KIAS	Operating range with flaps fully extended.
Green arc	69 - 151 KIAS	Normal operating range.
Yellow arc	151 - 188 KIAS	'Caution' range - "Only in smooth air".
Blue radial	85 KIAS	Best rate of climb speed, single engine.
Red radial	76 KIAS	Minimum control speed, single engine.
Red radial	188 KIAS	Maximum speed for all operations - $V_{NE}$ .

## 2.4 POWER-PLANT LIMITATIONS

- a) Number of engines : 2
- b) Engine manufacturer : Austro Engine
- c) Engine designation : E4-B
- d) RPM limitations (shown as propeller RPM)
- Maximum take-off (rpm) : 2300 RPM max. 5 min.
  - Maximum continuous (rpm) : 2100 RPM
  - Maximum overspeed : 2500 RPM max. 20 sec
- e) Engine power
- Max. take-off power : 100% (123.5 kW) max. 5 min.
  - Max. continuous power : 92% (114 kW)
- f) Oil pressure (absolute)
- Minimum < 1500 RPM : 1.5 bar
  - Minimum  $\geq$  1500 RPM : 2.5 bar
  - Maximum : 6.5 bar
  - Normal range : 2.5 bar - 6 bar

## g) Oil quantity

Minimum	:	5.0 l
Maximum	:	7.0 l
Maximum oil consumption	:	0.1 liters/hr

## h) Oil temperature

Minimum	:	- 30 °C
Maximum	:	140 °C
Normal range	:	50 °C - 125 °C

## i) Gearbox temperature

Minimum	:	- 30 °C
Minimum (full load)	:	35 °C
Maximum	:	120 °C

**NOTE**

A cautionary (yellow) gearbox temperature range is not imposed by the engine manufacturer. However, there is a delay between power changes and gearbox temperature. Therefore, a cautionary range has been added to the G1000 gearbox temperature instrument solely to make the pilot attentive to the gearbox temperature approaching the maximum allowable limit. There is no specific time limit associated with operating in the cautionary gearbox temperature range.

- j) Coolant temperature
- |                       |   |         |
|-----------------------|---|---------|
| Minimum (at start-up) | : | - 30 °C |
| Minimum (full load)   | : | 60 °C   |
| Maximum               | : | 105 °C  |

- k) Fuel temperature
- |         |   |        |
|---------|---|--------|
| Minimum | : | -25 °C |
| Maximum | : | 60 °C  |

- l) Fuel pressure
- |         |   |       |
|---------|---|-------|
| Minimum | : | 4 bar |
| Maximum | : | 7 bar |

### NOTE

The fuel pressure is not indicated on the G1000; on the system monitor a fuel pressure warning will illuminate if the pressure is below limit.

- m) Voltage
- |         |   |        |
|---------|---|--------|
| Minimum | : | 24.1 V |
| Maximum | : | 32.0 V |

- n) Amperage
- |         |   |      |
|---------|---|------|
| Maximum | : | 70 A |
|---------|---|------|



- o) Propeller manufacturer : mt-Propeller
- p) Propeller designation : MTV-6-R-C-F / CF 187-129
- q) Propeller diameter : 187 cm
- r) Prop. pitch angle (@ 0.75 R) :  $12^\circ \pm 0.2^\circ$  (low pitch)  
 $15^\circ \pm 1^\circ$  (start lock position)  
 $81^\circ \pm 1^\circ$  (feathered position)
- s) Governor : mt-Propeller P-877-16 electrical governor with feather position
- t) Oil specification : SHELL HELIX ULTRA 5W30  
 SHELL HELIX ULTRA 5W40
- u) Gearbox oil (propeller gearbox) : SHELL SPIRAX GSX 75W-80
- v) Coolant : Distilled water / cooler protection (BASF Glysantin Protect Plus / G48) 1/1. The freezing point of the coolant is - 38°C.

### CAUTION

If the coolant or gearbox oil level is low the reason must be determined and the problem must be corrected by authorized personnel.

- w) Maximum restart altitude : 18,000 ft pressure altitude  
 for immediate restarts  
 10,000 ft pressure altitude  
 for restarts within two minutes

x) Restart airspeed (starter) : max. 100 KIAS or airspeed for a stationary propeller, whichever is lower

Restart airspeed (windmilling) : 125 KIAS to 145 KIAS

y) No intentional shutdown below 5,000 and above 10,000 ft pressure altitude.

## 2.5 ENGINE INSTRUMENT MARKINGS

Engine instrument markings and their color code significance are shown in the tables below.

Indication	Red arc/bar = lower prohibited range	Yellow arc/bar = caution range	Green arc/bar = normal operating range	Yellow arc/bar = caution range	Red arc/bar = upper prohibited range
RPM	--	--	up to 2100 RPM	2100 to 2300 RPM	above 2300 RPM
Oil pressure	below 1.5 bar	1.5 to 2.5 bar	2.5 to 6.0 bar	6.0 to 6.5 bar	above 6.5 bar
Oil temp.	below -30°C	-30° to 50°C	50° to 125°C	125° to 140°C	above 140°C
Coolant temp.	below -30°C	-30° to 60°C	60° to 95°C	95° to 105°C	above 105°C
Gearbox temp.	below -30°C	-30° to 35°C	35° to 115°C	115° to 120°C	above 120°C
Load	--	--	up to 92%	92 - 100%	--
Fuel temp.	below -25°C	-25° to 5°C	5° to 55°C	55° to 60°C	above 60°C
Ammeter	--	--	up to 60A	60 to 70A	above 70A
Volt-meter	below 24.1V	24.1 to 25V	25 to 30V	30 to 32V	above 32V
Fuel qty.	below 1 US gal	--	1 to 25 US gal	--	--

## 2.6 WARNING, CAUTION AND ADVISORY ALERTS

### 2.6.1 WARNING, CAUTION AND ADVISORY ALERTS ON THE G1000

#### NOTE

The alerts described in the following are displayed on the Garmin G1000. Section 7.10 includes a detailed description of the alerts.

The following tables show the color and significance of the warning, caution and advisory alerts lights on the G1000.

#### Color and Significance of the Warning Alerts on the G1000

Warning alerts (red)	Meaning / Cause
WARNING	One of the warnings listed below is being indicated.
L/R ENG TEMP	Left / Right engine coolant temperature is in the upper red range (too high / >105 °C).
L/R OIL TEMP	Left / Right engine oil temperature is in the upper red range (too high / >140 °C).
L/R OIL PRES	Left / Right engine oil pressure is in the lower red range (too low / <1.5 bar).
L/R FUEL TEMP	Left / Right fuel temperature is in the upper red range (too high / >60 °C)
L/R GBOX TEMP	Left / Right engine gearbox temperature is in the upper red range (too high / >120 °C).
L/R FUEL PRESS	Left / Right engine fuel pressure is low.

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Warning alerts (red)	Meaning / Cause
L/R ALTN AMPS	Left / Right engine alternator output is in the upper red range (too high / >70 amps).
L/R ENG FIRE	Left / Right engine fire detected.
L/R STARTER	Left / Right engine starter is engaged.
DOOR OPEN	Front and/or rear canopy and/or baggage door are/is not closed and locked.
POSN ERROR	G1000 will no longer provide GPS based navigational guidance.
ATTITUDE FAIL	The display system is not receiving attitude reference information from the AHRS.
AIRSPEED FAIL	The display system is not receiving airspeed input from the air data computer.
ALTITUDE FAIL	The display system is not receiving altitude input from the air data computer.
VERT SPEED FAIL	The display system is not receiving vertical speed input from the air data computer.
HDG	The display system is not receiving valid heading input from the AHRS.
WARN	RAIM position warning. The nav deviation bar is removed.

Color and Significance of the Caution Alerts on the G1000

Caution alerts (amber)	Meaning / Cause
L/R ECU A FAIL	A fault has occurred in the left/right engine ECU A (one reset of minor faults is possible) or ECU A is being tested during FADEC-test procedure during the 'Before Take-Off Check'.
L/R ECU B FAIL	A fault has occurred in the left/right engine ECU B (one reset of minor faults is possible) or ECU B is being tested during FADEC-test procedure during the 'Before Take-Off Check'.
L/R FUEL LOW	Left / Right main tank fuel quantity is low.
L/R ALTN FAIL	Left / Right engine alternator has failed.
L/R VOLTS LOW	Left / Right engine bus voltage is too low (< 25 volts).
L/R COOL LVL	Left / Right engine coolant level is low.
PITOT FAIL	Pitot heat has failed.
PITOT HT OFF	Pitot heat is OFF.
STAL HT FAIL	Stall warning heat has failed.
STAL HT OFF	Stall warning heat is OFF.
STICK LIMIT	Control stick limiting system (variable elevator stop) has failed.
INTEG RAIM not available	RAIM (Receiver Autonomous Integrity Monitor) is not available.
AHRS ALIGN: Keep Wings Level	The AHRS (Attitude and Heading Reference System) is aligning.

<b>Caution alerts (amber)</b>	<b>Meaning / Cause</b>
L/R AUX FUEL E	Left / Right auxiliary fuel tank empty (if installed).
CHECK GEAR	Landing gear is not down and locked.
DEICE LVL LO	De-icing fluid level is low (if installed).
DEIC PRES HI	De-icing pressure is high (if installed).
DEIC PRES LO	De-icing pressure is low (if installed).

Color and Significance of the Advisory Alerts on the G1000

<b>Advisory alerts (white)</b>	<b>Meaning / Cause</b>
L/R GLOW ON	Left / Right engine glow plug active.
L/R AUXPUMP ON	Fuel transfer from auxiliary to main tank is in progress (if installed).
PFD FAN FAIL	Cooling fan for the PFD is inoperative.
MFD FAN FAIL	Cooling fan for the MFD is inoperative.
GIA FAN FAIL	Cooling fan for the GIAs is inoperative.

## **2.6.2 OTHER WARNING ALERTS**

Warning Alerts on the Instrument Panel

<b>Warning alert (red)</b>	<b>Meaning / Cause</b>
GEAR UNSAFE WARNING LIGHT	Illuminates if the landing gear is neither in the final up nor in the down & locked position.

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### Audible Warning Alerts

Audible warning alert	Meaning / Cause
GEAR RETRACTED CHIME TONE (repeating)	Resounds if the landing gear is retracted while the flaps move into position LDG or when the power lever is placed in a position below 25%.

## **2.7 MASS (WEIGHT)**

Value	Mass (Weight)	
Minimum flight mass	1510 kg	3329 lb
Maximum take-off mass	1900 kg	4189 lb
Maximum zero fuel mass	1765 kg	3891 lb
Maximum landing mass (see NOTE below)	1805 kg	3979 lb
Max. load in nose baggage compartment (in fuselage nose)	30 kg	66 lb
Max. load in cabin baggage compartment (behind rear seats)	45 kg	100 lb
Max. load in baggage extension (behind cabin baggage compartment)	18 kg	40 lb
Max. load, cabin baggage compartment and baggage extension together	45 kg	100 lb

### **WARNING**

Exceeding the mass limits will lead to overstressing of the airplane as well as to degradation of flight characteristics and flight performance.

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**NOTE**

In some countries the beginning of a flight is defined by starting the powerplant. In those countries a ramp mass of maximal MTOM + 8 kg (MTOM + 18 lb) is approved. At the time of lift-off the maximum permitted take-off mass must not be exceeded.

**NOTE**

A landing with a mass between 1805 kg (3979 lb) and 1900 kg (4189 lb) is admissible. It constitutes an abnormal operating procedure. A "Hard Landing Check" is only required after a hard landing, regardless of the actual landing mass.

## 2.8 CENTER OF GRAVITY

### Datum Plane

The datum plane (DP) is a plane which is normal to the airplane's longitudinal axis and in front of the airplane as seen from the direction of flight. The airplane's longitudinal axis is parallel with the floor of the nose baggage compartment. When the floor of the nose baggage compartment is aligned horizontally, the datum plane is vertical. The datum plane is located 2.196 meters (86.46 in) forward of the most forward point of the root rib on the stub wing (refer to figure in Section 6.2).

### Center of Gravity Limitations

The center of gravity (CG position) for flight conditions must be between the following limits:

Most forward flight CG:

2.357 m (92.80 in) aft of datum plane at 1510 kg (3329 lb)

2.418 m (95.20 in) aft of datum plane at max. take-off mass (see Section 2.7)

linear variation in between

Most rearward flight CG:

2.460 m (96.85 in) aft of datum plane at 1510 kg (3329 lb)

2.480 m (97.64 in) aft of datum plane at 1700 kg (3748 lb)

2.480 m (97.64 in) aft of datum plane at max. take-off mass (see Section 2.7)

linear variation in between

Refer to Section 6.4.4 for a graphical illustration of the CG limitations.

### **WARNING**

Exceeding the center of gravity limitations reduces the controllability and stability of the airplane.

## **2.9 APPROVED MANEUVERS**

The airplane is certified in the Normal Category in accordance with JAR-23.

### Approved Maneuvers

- 1) all normal flight maneuvers;
- 2) stalling (with the exception of dynamic stalling); and
- 3) Lazy Eights, Chandelles, as well as steep turns and similar maneuvers, in which an angle of bank of not more than 60° is attained.

### **CAUTION**

Aerobatics, spinning and flight maneuvers with more than 60° of bank are not permitted in the Normal Category. Stalling with asymmetric power or one engine inoperative is not permitted.

### **CAUTION**

Intentional negative g- maneuvers are not permitted.

## 2.10 MANEUVERING LOAD FACTORS

### NOTE

The tables below show structural limitations. The load factor limits for the engine must also be observed. Refer to the corresponding Operation Manual for the engine.

	at $v_o$	at $v_{NE}$	with flaps in APP or LDG position
Positive	3.8	3.8	2.0
Negative	-1.52	-1.52	

### WARNING

Exceeding the maximum structural load factors will lead to overstressing of the airplane.

### CAUTION

Intentional negative g- maneuvers are not permitted.

## **2.11 OPERATING ALTITUDE**

The maximum operating altitude is 18,000 ft (5,486 m) pressure altitude.

## **2.12 FLIGHT CREW**

Minimum crew : 1 (one person)

Maximum number of occupants : 4 (four persons)

## **2.13 KINDS OF OPERATION**

Provided that national operational requirements are met, the following kinds of operation are approved:

- daytime flights according to Visual Flight Rules (VFR)
- with the appropriate equipment: night flights according to Visual Flight Rules (NVFR)
- with the appropriate equipment: flights according to Instrument Flight Rules (IFR)
- take-off and landing on paved surfaces
- take-off and landing on grass surfaces

Flights into known or forecast thunderstorms are prohibited.

### **Minimum Operational Equipment (Serviceable)**

The following table lists the minimum serviceable equipment required by JAR-23. Additional minimum equipment for the intended operation may be required by national operating rules and also depends on the route to be flown.

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**NOTE**

Many of the items of minimum equipment listed in the following table are integrated in the G1000.

	<b>for daytime VFR flights</b>	<b>in addition for night VFR flights</b>	<b>in addition for IFR flights</b>
Flight & navigation instruments	<ul style="list-style-type: none"> <li>* airspeed indicator (on G1000 PFD or backup)</li> <li>* altimeter (on G1000 PFD or backup)</li> <li>* magnetic compass</li> <li>* 1 headset, used by pilot in command</li> </ul>	<ul style="list-style-type: none"> <li>* vertical speed indicator (VSI)</li> <li>* attitude gyro (artificial horizon; on G1000 PFD or backup)</li> <li>* turn &amp; bank indicator (on G1000 PFD)</li> <li>* directional gyro</li> <li>* VHF radio (COM) with speaker and microphone</li> <li>* VOR receiver</li> <li>* transponder (XPDR), mode A and mode C</li> <li>* GPS receiver (part of G1000)</li> </ul>	<ul style="list-style-type: none"> <li>* second airspeed indicator (both, on G1000 PFD and backup)</li> <li>* second altimeter (both, on G1000 PFD and backup)</li> <li>* second attitude gyro (both, on G1000 PFD and backup)</li> <li>* second VHF radio (COM)</li> <li>* VOR-LOC-GP receiver</li> <li>* second GPS receiver (part of G1000)</li> </ul>

	for daytime VFR flights	in addition for night VFR flights	in addition for IFR flights
Engine instruments	<ul style="list-style-type: none"> <li>* fuel qty. (2x)</li> <li>* oil press. (2x)</li> <li>* oil temp. (2x)</li> <li>* coolant temp. (2x)</li> <li>* coolant level indicator (2x)</li> <li>* gearbox temp. (2x)</li> <li>* load (2x)</li> <li>* prop. RPM (2x)</li> <li>* fuel temp. left &amp; right tank</li> <li>* fuel flow (2x)</li> <li>* fuel px warning</li> </ul>	<ul style="list-style-type: none"> <li>* ammeter</li> <li>* voltmeter</li> </ul>	
Lighting		<ul style="list-style-type: none"> <li>* position lights</li> <li>* strobe lights (anti collision lights)</li> <li>* landing light</li> <li>* instrument lighting</li> <li>* flood light</li> <li>* flashlight</li> </ul>	

	for daytime VFR flights	in addition for night VFR flights	in addition for IFR flights
Other operational minimum equipment	<ul style="list-style-type: none"> <li>* stall warning system</li> <li>* variable elevator stop</li> <li>* alternate means for fuel quantity indication (see Section 7.9)</li> <li>* safety belts for each occupied seat</li> <li>* Airplane Flight Manual</li> </ul>	<ul style="list-style-type: none"> <li>* Pitot heating system</li> <li>* alternate static valve</li> </ul>	<ul style="list-style-type: none"> <li>* emergency battery (for backup attitude gyro and flood light)</li> </ul>

**NOTE**

A list of approved equipment can be found in Chapter 6.

Engine Systems and Equipment

All engine systems and equipment must be functional prior to airplane take-off. Any engine system or equipment failure must be corrected before next flight.



## 2.14 FUEL

Approved fuel grades : JET A (ASTM D 1655),  
 JET A-1 (ASTM D 1655).

### NOTE

A minimum cetane number of 37 determined acc. to  
 EN ISO 5165/ASTM D613 is recommended.

### NOTE

Use only uncontaminated fuel from reliable sources.

	Main Tanks		Auxiliary Tanks (if installed)		Total	
	US gal	liters	US gal	liters	US gal	liters
Total fuel quantity	2 x 26.0	2 x 98.4	2 x 13.7	2 x 52.0	2 x 39.7	2 x 150.4
Usable fuel	2 x 25.0	2 x 94.6	2 x 13.2	2 x 50.0	2 x 38.2	2 x 144.6
Max. permissible difference LH/RH	5.0	18.9				

## 2.15 LIMITATION PLACARDS

All *limitation* placards are shown below. A list of *all* placards is included in the Airplane Maintenance Manual (Doc. No. 7.02.15), Chapter 11.

The following limitation placards are in the forward view of the pilot:

### Limitations for GFC 700 Autopilot System:

Autopilot / Yaw Damper DISC during take-off and landing.

Do not use AP during single engine operation.

Maximum speed for autopilot operation is 180 KIAS.

Minimum speed for autopilot operation is 90 KIAS.

#### Minimum Altitude for Autopilot Operation:

Cruise, Climb, Descent and Maneuvering: 800 feet AGL

Approach : 200 feet AGL

Departure : 200 feet AGL

This airplane may only be operated in accordance with the Airplane Flight Manual in the "Normal" category in non-icing conditions. Provided that national operational requirements are met and the appropriate equipment is installed and operational, this airplane is approved for the following kinds of operation: day VFR, night VFR and IFR. All aerobatic maneuvers including spinning are prohibited. For further operational limitations refer to the Airplane Flight Manual.

Operating maneuvering speed:

$v_o = 122$  KIAS (above 1800 kg / 3968 lb)

$v_o = 119$  KIAS (above 1700 kg / 3748 lb to 1800 kg / 3968 lb)

$v_o = 112$  KIAS (up to 1700 kg / 3748 lb )

GPS NOT APPROVED  
FOR WAAS OPERATIONS

**LANDING GEAR**

$v_{LE} / v_{LOE} = 188$  KIAS

$v_{LOR} = 152$  KIAS

On the Emergency Landing Gear Extension Lever:

**EMERGENCY  
Gear Extension  
Max. 152 KIAS**

On the Instrument Panel:

*Standard Tank:*

**max. usable  
fuel: 2 x 25 US gal**  
max. difference LH/RH  
tank: 5 US gal

*Auxiliary Tank (if installed):*

**max. usable fuel**  
**main tank:**  
**2 x 25 US gal**  
**auxiliary tank:**  
**2 x 13 US gal**  
max. difference LH/RH  
main tank: 5 US gal

Next to the Fuel Selector:

Crossfeed  
with fuel  
pump ON in  
emergencies  
only

(a) Next to Each of the Two Fuel Filler Necks:

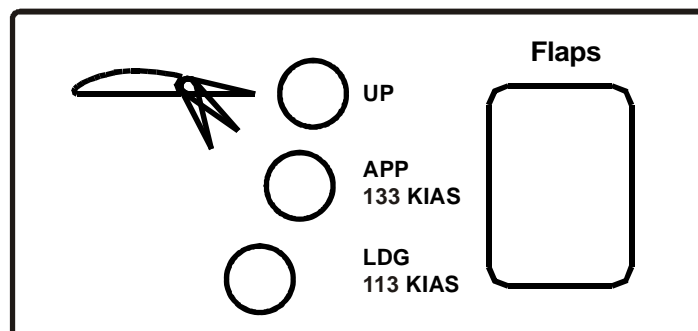
(b) In Addition Next to Each of the Two Auxiliary Fuel Filler Necks (if installed):

**WARNING**  
**APPROVED FUEL**  
**JET-A1**  
**or see Airplane Flight Manual**

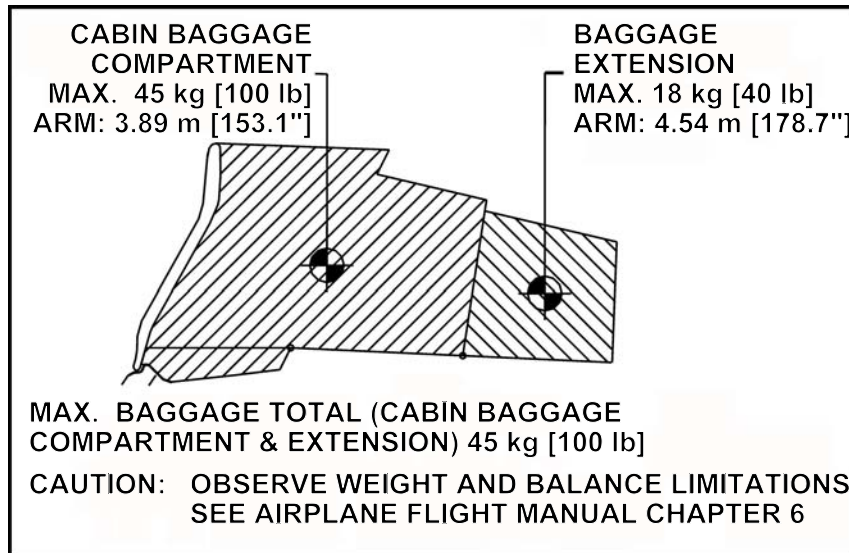
In Each Cowling, on the Door for the Oil Filler Neck:

**OIL**  
**SHELL HELIX**  
**ULTRA**  
**5W30**  
or see Airplane  
Flight Manual

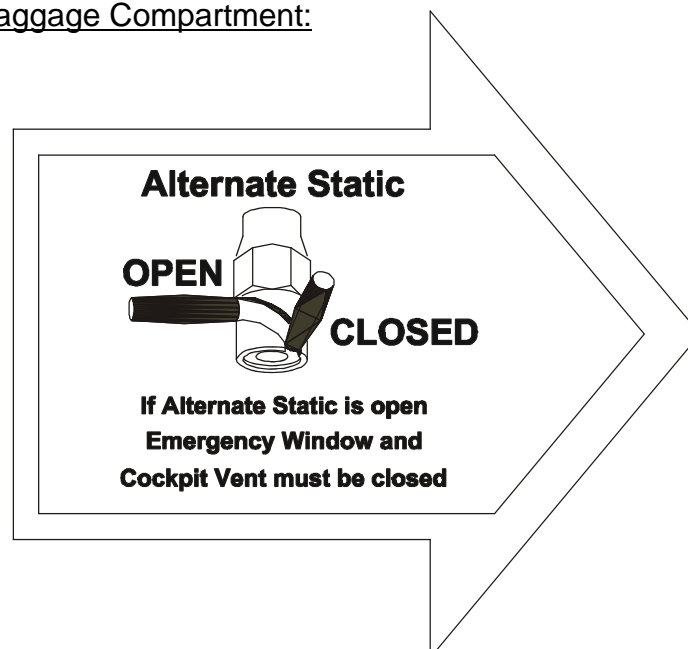
Next to the Flap Selector Switch:



In the Cabin, on the Left Fuselage Sidewall:



Next to the Cabin Baggage Compartment:



In the Nose Baggage Compartment:

**Max. Baggage:**  
**30 kg [66 lb]**

Beside the Door Locking Device Installed in the Passengers' Door:

**EMERGENCY EXIT:**  
The keylock must be  
unlocked during flight

On the Right-Hand Side of the Instrument Panel Above the Circuit Breakers:

— NO SMOKING —

## **2.16 OTHER LIMITATIONS**

### **2.16.1 FUEL TEMPERATURE**

From -25 °C to 60 °C (from -13 °F to 140 °F).

### **2.16.2 BATTERY CHARGE**

Taking off for a Night VFR or IFR flight with an empty battery is not permitted.

The use of an external power supply for engine starting with an empty airplane battery is also not permitted if the subsequent flight is intended to be a Night VFR or IFR flight. In this case the airplane battery must first be charged.

### **2.16.3 EMERGENCY SWITCH**

IFR flights are not permitted when the seal on the emergency switch is broken.

### **2.16.4 DOOR LOCKING DEVICE**

The canopy and the passenger door must not be blocked by the key lock during operation of the airplane.



### 2.16.5 ELECTRONIC EQUIPMENT

The use and switching on of electronic equipment other than that which is part of the equipment of the airplane is not permitted, as it could lead to interference with the airplane's avionics.

Examples of undesirable items of equipment are:

- Mobile phones
- Remote radio controls
- Video screens employing CRTs
- Minidisc recorders in record mode

This list is not exhaustive.

The use of laptop computers, including those with CD-ROM drives, CD and minidisc players in the replay mode, cassette players and video cameras is permitted. All this equipment however should be switched off for take-off and landing.

**2.16.6 GARMIN G1000 AVIONICS SYSTEM**

1. The Garmin G1000 Cockpit Reference Guide, P/N 190-00963-00, appropriate revision must be immediately available to the flight crew.
2. The G1000 must utilize the software Garmin 010-00670-01 approved software in accordance with the mandatory service bulletin DAI MSB 42NG-003, latest version.

Software Part Number	Approved Version	Function
<b>System</b>	for approved version see DAI MSB 42NG-003 latest version	
010-00670-01		
<b>Manifest</b>		
006-B0093-( )		GPS1, GPS2
006-B0172-( )		GTX1-GIA1, GTX1-GIA2
006-B0190-( )		GIA1, GIA2
006-B0193-( )		GEA1-GIA1; GEA1-GIA2
006-B0203-( )		GMA1-GIA1, GMA1-GAI2
006-B0223-( )		GRS1-GIA1, GRS1-GIA2
006-B0224-( )		GMU1
006-B0319-( )		PFD1, MFD1
006-B0328-( )		
006-B0329-( )		
006-C0048-( )		GMU1 FPGA
006-C0049-( )		GRS1 FPGA
006-C0055-( )		GDC1 FPGA
006-D0159-( )		GRS1 MV DB
006-D0202-( )		
006-B0261-( )		GDC1-GIA1
006-B0081-( )		COM1, COM2
006-B0083-( )		GS1, GS2
006-B0082-( )		NAV1, NAV2

**NOTE**

The database version is displayed on the MFD power-up page immediately after system power-up and must be acknowledged. The remaining system software versions can be verified on the AUX group sub-page 5, "AUX-SYSTEM STATUS".

3. IFR enroute, oceanic and terminal navigation predicated upon the G1000 GPS Receiver is prohibited unless the pilot verifies the currency of the database or verifies each selected way point for accuracy by reference to current approved data.
4. Instrument approach navigation predicated upon the G1000 GPS Receiver must be accomplished in accordance with approved instrument approach procedures that are retrieved from the GPS equipment database. The GPS equipment database must incorporate the current update cycle.

**NOTE**

Not all published approaches are in the FMS database. The pilot must ensure that the planned approach is in the database.

- (a) Instrument approaches utilizing the GPS receiver must be conducted in the approach mode and Receiver Autonomous Integrity Monitoring (RAIM) must be available at the Final Approach Fix.
- (b) Accomplishment of ILS, LOC, LOC-BC, LDA, SDF, MLS or any other type of approach not approved for GPS overlay with the G1000 GPS receiver is not authorized.
- (c) Use of the G1000 VOR/ILS receiver to fly approaches not approved for GPS require VOR/ILS navigation data to be present on the display.

- (d) When an alternate airport is required by the applicable operating rules, it must be served by an approach based on other than GPS or Loran-C navigation, the airplane must have the operational equipment capable of using that navigation aid, and the required navigation aid must be operational.
  - (e) VNAV information may be utilized for advisory information only. Use of VNAV information for Instrument Approach Procedures does not guarantee step-down fix altitude protection, or arrival at approach minimums in normal position to land.
  - (f) RNAV (GPS) approaches must be conducted utilizing the GPS sensor.
  - (g) RNP RNAV operations are not authorized, except as noted in Chapter 1 of this AFM.
5. If not previously defined, the following default settings must be made in the "SYSTEM SETUP" menu of the G1000 prior to operation (refer to Pilot's Guide for procedure if necessary):
- (a) DIS, SPD : nm, kt (sets navigation units to "nautical miles" and "knots")
  - (b) ALT, VS : ft, fpm (sets altitude units to "feet" and "feet per minute")
  - (c) POSITION : deg-min (sets navigation grid units to decimal minutes)

### NOTE

Navigation Information is referenced to WGS-84 reference system, and should only be used where the Aeronautical Information Publication (including electronic data and aeronautical charts) conforms to WGS-84 or equivalent.

6. When AHRS is required to meet the items listed in the Minimum operational equipment (serviceable) table in Section 2.13 of this AFM, operation is prohibited in the following areas:

- (a) north of 70° N and south of 70° S latitudes,
- (b) north of 65° N between 75° W and 120° W longitude, and
- (c) south of 55° S between 120° E and 165° E longitude.

When day VFR operations are conducted in the above areas, the MFD must be in a non-heading up orientation.

7. The fuel quantity, fuel required, and fuel remaining functions on the Fuel Page (displayed when pushing the FUEL button as shown in Section 7.13) of the FMS are supplemental information only and must be verified by the flight crew.

8. The GPS is not approved for WAAS operations:

- (a) The G1000 integrated avionics system is NOT approved for GPS WAAS operations including GPS WAAS approach procedures such as "LPV", "LNAV/VNAV", and "LNAV +V".
- (b) SBAS (WAAS & MSAS) functionality must be disabled on the G 1000 GPS Status page (refer to the G1000 Pilot's Guide for procedure).

9. The availability of SafeTaxi<sup>®</sup>, ChartView, or FliteCharts<sup>®</sup> in electronic form on the G1000 is for information purposes only, it is still mandatory to carry another source of charts on-board the airplane.

### 2.16.7 AUTOPILOT LIMITATIONS

1. It is the responsibility of the pilot in command to monitor the autopilot when it is engaged. The pilot should be prepared to immediately disconnect the autopilot and to take prompt corrective action in the event of unexpected or unusual autopilot behavior.
2. The autopilot and yaw damper must be disconnected (using the DISC button) during take-off, landing and single engine operation.
3. Following an autopilot or electric trim malfunction, reengaging the autopilot or manual electric trim, or resetting the AUTOPILOT circuit breaker is prohibited until the cause of the malfunction has been determined and corrected.
4. The Garmin G1000 Cockpit Reference Guide for the Diamond DA 42 NG, P/N 010-00963-00 approved revision must be immediately available to the flight crew.
5. ILS approaches using the GFC700 / flight director are limited to Category I approaches only.
6. Autopilot maximum airspeed: 180 KIAS  
Autopilot minimum airspeed: 90 KIAS
7. Altitude select captures below 1200 feet AGL are prohibited.
8. The autopilot must be disengaged:
  - below 200 ft AGL during approach,
  - below 200 ft AGL during departure,
  - below 800 ft AGL for all other phases of flight,
  - during single engine operation.
9. Overriding the autopilot to change pitch or roll attitude is prohibited. (Disengage or press CWS while maneuvering.)

10. The GFC 700 components must utilize the following or later approved software versions:

Sub-System	Software Version
GDU	v9.03
GDC 74	v3.02
GEA 7X	v2.07
GPS	v3.03
GIA 6X	v5.65
GIA Audio	v2.03
GMAX347	v4.01
GMU44	v2.01
GRS 77	v2.11
GTX 33X	v5.01
GDL 69	v3.20.00
GSA 8X	v2.20
GFC 700	v2.00

The system software versions can be verified on the AUX group sub-page 5, "AUX - SYSTEM STATUS".

11. The GFC 700 AFCS pre-flight test must be successfully completed prior to use of the autopilot, flight director, yaw damper or manual electric trim.
12. A pilot with the seat belt fastened must occupy the left pilot's seat during all operations.
13. The yaw damper is an integral part of the autopilot system and must not be used separately.

#### **2.16.8 SMOKING**

Smoking in the airplane is not permitted.

#### **2.16.9 GROUND OPERATION**

Take-off and landing has been demonstrated on hard paved surfaces (asphalt, concrete, etc.) and grass runways.

#### **2.16.10 USE OF THE SUN VISORS**

The sun visors (if installed, OÄM 42-101) may only be used during cruise. During all other phases of flight the sun visors must be locked in the fully upward position.



## CHAPTER 3

# EMERGENCY PROCEDURES

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**NOTE**

Procedures for uncritical system faults are given in Chapter  
4B - ABNORMAL OPERATING PROCEDURES.

## **3.1 INTRODUCTION**

### **3.1.1 GENERAL**

This chapter contains checklists as well as the description of recommended procedures to be followed in the event of an emergency. Engine failure or other airplane-related emergencies are most unlikely to occur if the prescribed procedures for pre-flight checks and airplane maintenance are followed.

If, nonetheless, an emergency does arise, the guidelines given in this chapter should be followed and applied in order to clear the problem.

As it is impossible to foresee all kinds of emergencies and cover them in this Airplane Flight Manual, a thorough understanding of the airplane by the pilot is, in addition to his knowledge and experience, an essential factor in the solution of any problems which may arise.

### **WARNING**

In each emergency, control over the flight attitude and the preparation of a possible emergency landing have priority over attempts to solve the current problem ("first fly the airplane"). Prior to the flight the pilot must consider the suitability of the terrain for an emergency landing for each phase of the flight. For a safe flight the pilot must constantly keep a safe minimum flight altitude. Solutions for various adverse scenarios should be thought over in advance. This should prevent a situation where the pilot is faced with an emergency he cannot handle calmly and with determination.

### 3.1.2 CERTAIN AIRSPEEDS IN EMERGENCIES

Event	
One engine inoperative minimum control speed (air) $v_{MCA}$	76 KIAS
One engine inoperative speed for best rate of climb $v_{YSE}$	85 KIAS

### 3.1.3 SELECTING EMERGENCY FREQUENCY

In an in-flight emergency, depressing and holding the Com transfer button  $\leftrightarrow$  on the G1000 for 2 seconds will tune the emergency frequency of 121.500 MHz. If the display is available, it will also show it in the "Active" frequency window.

## **3.2 AIRPLANE-RELATED G1000 WARNINGS**

### **3.2.1 WARNINGS / GENERAL**

"Warning" means that the non-observation of the corresponding procedure leads to an immediate or important degradation in flight safety. The warning text is displayed in red color. A warning chime tone of 1.5 seconds duration will sound and repeat without delay until the alarm is acknowledged by the crew.

### **3.2.2 L/R ENG TEMP**

<b>L/R ENG TEMP</b>	Left / Right engine coolant temperature is in the upper red range (too high / above 105 °C)
---------------------	---

Coolant temperatures above the limit value of 105 °C can lead to a total loss of power due to engine failure.

- Check G1000 for L/R COOL LVL caution message (low coolant level)

*L/R COOL LVL caution message not displayed:*

During climb:

- Reduce power on affected engine by 10 % or more as required.
- Increase airspeed by 10 KIAS or more as required.
- If the coolant temperature does not reach the green range within 60 seconds, reduce power on affected engine as far as possible and increase airspeed.

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During cruise:

- Reduce power on affected engine.
- Increase airspeed.
- Check coolant temperature in green range.

### **CAUTION**

If high coolant temperature is indicated and the L/R COOL LVL caution message is not displayed, it can be assumed that there is no technical defect in the cooling system and that the above mentioned procedure can decrease the temperature(s). This might not be the case if the coolant temperature does not return to the green range. In this case perform a precautionary landing on the nearest suitable airfield. Prepare for an engine failure in accordance with 3.7.6 - ENGINE FAILURES IN FLIGHT.

### **END OF CHECKLIST**

*L/R COOL LVL caution message displayed:*

- Reduce power on affected engine.
- Expect loss of coolant.

### **WARNING**

A further increase in coolant temperature must be expected. Prepare for an engine failure in accordance with 3.7.6 - ENGINE FAILURES IN FLIGHT.

### **END OF CHECKLIST**

### 3.2.3 L/R OIL TEMP

<b>L/R OIL TEMP</b>	Left / Right engine oil temperature is in the upper red range (too high / above 140 °C).
---------------------	--

Oil temperatures above the limit value of 140 °C can lead to a total loss of power due to engine failure.

- Check oil pressure.

*If the oil pressure is outside of the green range (lower limit):*

- Reduce power on affected engine.
- Expect loss of engine oil.

### **WARNING**

A further increase in oil temperature must be expected.  
Prepare for an engine failure in accordance with  
3.7.6 - ENGINE FAILURES IN FLIGHT.

*If the oil pressure is within the green range:*

- Reduce power on affected engine.
- Increase airspeed.

**CONTINUED**

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### CAUTION

If high oil temperature is announced and the oil pressure indication is within the green range, it can be assumed that there is no technical defect in the engine oil system and that the above mentioned procedure can decrease the temperature(s). This might not be the case if the oil temperature does not return to the green range. In this case perform a precautionary landing on the nearest suitable airfield. Prepare for an engine failure in accordance with 3.7.6 - ENGINE FAILURES IN FLIGHT.

### END OF CHECKLIST

#### 3.2.4 L/R OIL PRES

<b>L/R OIL PRES</b>	Left / Right engine oil pressure is in the lower red range (too low / below 1.5 bar).
---------------------	---

Oil pressures below the limit value of 1.5 bar can lead to a total loss of power due to engine failure.

- Reduce power on affected engine.
- Expect loss of oil.

### WARNING

Land at the nearest suitable airfield. Prepare for an engine failure in accordance with 3.7.6 - ENGINE FAILURES IN FLIGHT.

### END OF CHECKLIST

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### 3.2.5 L/R GBOX TEMP

<b>L/R GBOX TEMP</b>	Left / Right engine gearbox temperature is in the upper red range (too high / above 120 °C).
----------------------	--

Gearbox temperatures above the limit value of 120 °C can lead to a total loss of power due to engine failure.

- Reduce power on affected engine.
- Increase airspeed.

### **CAUTION**

At high ambient temperature conditions and/or at low airspeeds with high power settings, it can be assumed that there is no technical defect in the gearbox and that the above mentioned procedure will decrease the temperature(s). This might not be the case if the gearbox temperature does not return to the green range. In this case perform a precautionary landing on the nearest suitable airfield. Prepare for an engine failure in accordance with 3.7.6 - ENGINE FAILURES IN FLIGHT.

**END OF CHECKLIST**

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### 3.2.6 L/R FUEL TEMP

<b>L/R FUEL TEMP</b>	Left / Right fuel temperature is in the upper red range (too high / above 60 °C).
----------------------	---

Fuel temperatures above the limit value of 60 °C can lead to a noticeable reduction of the high pressure pump efficiency.

- Reduce power on affected engine.
- Increase airspeed.

### **CAUTION**

At high ambient temperature conditions and/or at low airspeeds with high power settings and low fuel quantities, it can be assumed that the above mentioned procedure will decrease the temperature(s). If the fuel temperature does not return to the green range, perform a precautionary landing on the nearest suitable airfield.

### **NOTE**

Increased fuel temperature can occur when the fuel quantity in the main tank is low. If the auxiliary tank is installed the fuel temperature can be decreased by transferring fuel from the auxiliary to the main tank.

**END OF CHECKLIST**

**3.2.7 L/R FUEL PRESS**

<b>L/R FUEL PRESS</b>	Left / Right engine fuel pressure is low.
-----------------------	---

1. Fuel quantity ..... check
2. FUEL SELECTOR of affected engine ..... check ON
3. Fuel pump of affected engine ..... ON

*if L/R FUEL PRESS warning remains:*

4. Fuel pump of affected engine ..... OFF
5. FUEL SELECTOR of affected engine ..... CROSSFEED

*if L/R FUEL PRESS warning still remains:*

**WARNING**

Imminent engine failure must be expected. Prepare for an engine failure in accordance with 3.7.6 - ENGINE FAILURE IN FLIGHT.

**END OF CHECKLIST**

**3.2.8 L/R ALTN AMPS**

<b>L/R ALTN AMPS</b>	Left / Right engine alternator output is in the upper red range (too high / above 70 amps).
----------------------	---

Proceed according to:

3.9.2 - HIGH CURRENT

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**3.2.9 L/R ENG FIRE****L/R ENG FIRE**

Left / Right engine fire detected.

Engine fire can lead to a total loss of power due to engine failure as well as severe structural damage.

Proceed according to the following procedures as applicable:

3.10.1 - ENGINE FIRE ON GROUND

3.10.2 - ENGINE FIRE DURING TAKE-OFF

3.10.3 - ENGINE FIRE IN FLIGHT

### 3.2.10 L/R STARTER

<b>L/R STARTER</b>	Left / Right engine starter is engaged.
--------------------	---

Proceed according to:

### 3.9.3 - STARTER MALFUNCTION

### 3.2.11 DOOR OPEN

<b>DOOR OPEN</b>	Front and/or rear canopy and/or baggage door are/is not closed and locked.
------------------	--

Proceed according to:

### 3.11.2 - UNLOCKED DOORS

**3.3 AIRPLANE-RELATED G1000 CAUTIONS**

**3.3.1 L/R ALTN FAIL**

<b>L/R ALTN FAIL</b>	Left / Right engine alternator has failed.
----------------------	--

(a) One Alternator Failed

Proceed according to:

4B.4.6 - L/R ALTN FAIL

(b) Both Alternators Failed

**WARNING**

If both alternators fail at the same time, reduce all electrical equipment to a minimum. Expect battery power to last 30 minutes and land the airplane as soon as possible. Expect engine stoppage after this period of time.

- 1. AVIONICS MASTER ..... OFF
- 2. LH / RH Alternator ..... OFF
- 3. XPDR ..... STBY
- 4. LANDING GEAR ..... down, when down and locked pull  
Emergency Release
- 5. Stall / Pitot heat ..... OFF
- 6. All lights ..... OFF

**END OF CHECKLIST**

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### **3.4 G1000 SYSTEM WARNINGS**

#### **3.4.1 RED X**

A red X through any display field, such as COM frequencies, NAV frequencies, or engine data, indicates that display field is not receiving valid data.

#### **3.4.2 POSN ERROR**

<b>POSN ERROR</b>	The system will flag and no longer provide GPS based navigational guidance.
-------------------	---

Revert to the G1000 VOR/ILS receivers or an alternate means of navigation other than the G1000 GPS receivers.

#### **3.4.3 ATTITUDE FAIL**

<b>ATTITUDE FAIL</b>	The display system is not receiving attitude reference information from the AHRS; accompanied by the removal of sky/ground presentation and a red X over the attitude area.
----------------------	---

Revert to the standby attitude indicator.

#### **3.4.4 AIRSPEED FAIL**

<b>AIRSPEED FAIL</b>	The display system is not receiving airspeed input from the air data computer; accompanied by a red X through the airspeed display.
----------------------	---

Revert to the standby airspeed indicator.



**3.4.5 ALTITUDE FAIL**

<b>ALTITUDE FAIL</b>	The display system is not receiving altitude input from the air data computer; accompanied by a red X through the altimeter display.
----------------------	--

Revert to the standby altimeter.

**3.4.6 VERT SPEED FAIL**

<b>VERT SPEED FAIL</b>	The display system is not receiving vertical speed input from the air data computer; accompanied by a red X through the vertical speed display.
------------------------	---

Determine vertical speed based on the change of altitude information.

**3.4.7 HDG**

<b>HDG</b>	The display system is not receiving valid heading input from the AHRS; accompanied by a red X through the digital heading display.
------------	--

Revert to the emergency compass.

**3.4.8 WARN**

<b>WARN</b>	RAIM position warning - nav deviation bar removed.
-------------	--

1. CDI softkey ..... switch to VOR/LOC

### **3.5 G1000 FAILURES**

#### **3.5.1 NAVIGATION INFORMATION FAILURE**

If Garmin G1000 GPS navigation information is not available or invalid, utilize remaining operational navigation equipment as required.

#### **3.5.2 PFD OR MFD DISPLAY FAILURE**

1. DISPLAY BACKUP button on audio panel . . PUSH

##### Automatic Entry of Display Reversionary Mode

If the PFD and MFD have automatically entered reversionary mode, use the following procedure.

- (a) DISPLAY BACKUP button on audio panel ..... PUSH (button will be OUT)

#### **NOTE**

After automatic entry of reversionary mode, the pilot must press the DISPLAY BACKUP button on the audio panel. After the DISPLAY BACKUP button has been pushed, the system will remain in reversionary mode even if the problem causing the automatic entry of reversionary mode is resolved. A maximum of one attempt to return to normal mode is approved using the following procedure.

(b) DISPLAY BACKUP button on audio panel ..... PUSH (button will be IN)

- If the system returns to normal mode, leave the DISPLAY BACKUP button IN and continue.
- If the system remains in reversionary mode, or abnormal display behavior such as display flashing occurs, then return the DISPLAY BACKUP button to the OUT position.

**3.5.3 AHRS FAILURE**

**NOTE**

A failure of the Attitude and Heading Reference System (AHRS) is indicated by a removal of the sky/ground presentation and a red X and a yellow "AHRS FAILURE" shown on the PFD. The digital heading presentation will be replaced with a yellow "HDG" and the compass rose digits will be removed. The course pointer will indicate straight up and course may be set using the digital window.

1. Use standby attitude indicator, emergency compass and navigation map
2. Course ..... set using digital window

### **3.5.4 AIR DATA COMPUTER (ADC) FAILURE**

#### **NOTE**

Complete loss of the Air Data Computer is indicated by a red X and yellow text over the airspeed, altimeter, vertical speed, TAS and OAT displays. Some FMS functions, such as true airspeed and wind calculations, will also be lost.

1. Use standby airspeed indicator and altimeter.

### **3.5.5 ERRONEOUS OR LOSS OF ENGINE AND FUEL DISPLAYS**

#### **NOTE**

Loss of an engine parameter is indicated by a red X through the data field. Erroneous information may be identified by indications which do not agree with other system information. Erroneous indications may be determined by comparing a display with other displays and other system information.

1. Set power based on power lever position, engine noise and speed.
2. Monitor other indications to determine the health of the engine.
3. Use known power settings and Section 5.3.2 of the AFM for approximate fuel flow values.
4. Use other system information, such as annunciator messages, GPS fuel quantity and flow to safely complete the flight.

**3.5.6 ERRONEOUS OR LOSS OF WARNING/CAUTION ANNUNCIATORS****NOTE**

Loss of an annunciator may be indicated when engine or fuel displays show an abnormal or emergency situation and the annunciator is not present. An erroneous annunciator may be identified when an annunciator appears which does not agree with other displays or system information.

1. If an annunciator appears, treat it as if the condition exists.  
Refer to Chapter 3 - EMERGENCY PROCEDURES or Chapter 4B -ABNORMAL OPERATING PROCEDURES.
2. If a display indicates an abnormal condition but no annunciator is present, use other system information, such as engine displays, GPS fuel quantity and flow to determine if the condition exists. If it cannot be determined that the condition does not exist, treat the situation as if the condition exists.  
Refer to Chapter 3 - EMERGENCY PROCEDURES or Chapter 4B - ABNORMAL OPERATING PROCEDURES.

### **3.6 ABNORMAL ENGINE BEHAVIOUR**

1. Full power ..... apply

If the abnormal engine behavior sustains, refer to 3.7 - ONE ENGINE INOPERATIVE PROCEDURES.

**END OF CHECKLIST**

### **3.7 ONE ENGINE INOPERATIVE PROCEDURES**

#### **WARNING**

In certain combinations of airplane weight, configuration, ambient conditions, speed and pilot skill, negative climb performance may result. Refer to Chapter 5 - PERFORMANCE for one engine inoperative performance data.

In any event the sudden application of power during one-engine inoperative operation makes the control of the airplane more difficult.

#### **CAUTION**

Below 10,000 ft pressure altitude, do not attempt an in-flight engine restart if the engine has been shutdown for more than two minutes. Above 10,000 ft pressure altitude only immediate restart is possible.

### 3.7.1 DETECTING THE INOPERATIVE ENGINE

#### **NOTE**

One engine inoperative means an asymmetric loss of thrust, resulting in uncommanded yaw and roll in direction of the so-called "dead" engine (with coordinated controls). To handle this situation it is vital to maintain directional control by mainly rudder and additional aileron input. The following mnemonic can help to identify the failed engine:

"Dead foot - dead engine"

This means that, once directional control is re-established, the pilot can feel the control force on the foot pushing the rudder-pedal on the side of the operative engine, while the foot on the side of the failed engine feels no force. Further, the engine instruments can help to analyze the situation.



**3.7.2 ENGINE TROUBLESHOOTING**

**WARNING**

Control over the flight attitude has priority over attempts to solve the current problem ("first fly the airplane").

**NOTE**

With respect to handling and performance, the left-hand engine (pilots view) is considered the "critical" engine.

**NOTE**

If the loss of power was due to unintentional setting of the POWER lever, you may adjust the friction lock and continue your flight.

Depending on the situation the following attempts can be made to restore normal engine operation:

- 1. Circuit breakers ..... check / reset if necessary

If normal engine operation is restored continue flight and land as soon as possible.

Otherwise:

- 2. VOTER switch ..... swap between ECU A and B

If either ECU A or B setting restores normal engine operation then maintain that ECU setting and land as soon as possible.

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Otherwise:

3. VOTER switch . . . . . switch back to AUTO to retain ECU redundancy

If normal engine operation is restored continue flight and land as soon as possible.

Otherwise:

4. FUEL SELECTOR of affected engine . . . . . CROSSFEED

**CAUTION**

Switching on the fuel pump of the affected engine in combination with CROSSFEED may cause damage to the high-pressure pump.

If normal engine operation is restored continue flight. Remain within maximum allowable lateral imbalance.

Otherwise:

5. FUEL SELECTOR of affected engine . . . . . ON / CROSSFEED as required
6. ALTERNATE AIR . . . . . OPEN
7. POWER lever of affected engine . . . . . apply power as required

If normal engine operation is restored continue flight and land as soon as practicable.

If normal engine operation could not be restored by following the procedures in this section prepare for 3.7.3 - ENGINE SECURING (FEATHERING) PROCEDURE and land as soon as possible.

**END OF CHECKLIST**

**3.7.3 ENGINE SECURING (FEATHERING) PROCEDURE**

*Shut down and feathering of the affected engine:*

1. Affected engine . . . . . identify & verify
2. ENGINE MASTER affected engine . . . . . OFF

**CAUTION**

Do not shut down an engine with the FUEL SELECTOR valve.  
Otherwise the high pressure fuel pump can be damaged.

*Securing the feathered engine:*

3. Alternator affected engine . . . . . OFF
4. Fuel pump . . . . . check OFF
5. FUEL SELECTOR affected engine . . . . . OFF

**NOTE**

The remaining fuel in the tank of the secured engine can be used for the remaining engine to extend range and maintain lateral balance by setting its FUEL SELECTOR in the CROSSFEED position.

If one of the POWER levers is set to low settings the landing gear warning horn is activated. Set the POWER lever of the secured engine forward as required to mute the warning horn.

**END OF CHECKLIST**

### **3.7.4 UNFEATHERING & RESTARTING THE ENGINE IN FLIGHT**

If the reason for the shutdown has been ascertained and there is no indication of malfunction or engine fire a restart may be attempted.

#### Restarting the Engine with the Starter

Maximum restart altitude:           18,000 ft pressure altitude  
  for immediate restart.  
  10,000 ft pressure altitude  
  for restarts within two minutes.

#### **CAUTION**

Do not attempt an in-flight engine restart if the engine has been shutdown for more than two minutes.

#### **NOTE**

If the engine is allowed to cool down for more than two minutes a successful restart may not be possible.

Maximum restart airspeed:           max. 100 KIAS or airspeed for a stationary  
  propeller, whichever is lower.

#### **CAUTION**

Do not engage the starter when the propeller is windmilling.

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### NOTE

At airspeeds below 100 KIAS it is possible that the propeller may windmill intermittently. Therefore, care should be taken to ensure that the propeller is stationary when engaging the starter.

1. POWER lever of affected engine . . . . . IDLE
2. FUEL SELECTOR of affected engine . . . . . check ON
3. Alternate air . . . . . as required
4. ALTERNATOR of affected engine . . . . . ON
5. ENGINE MASTER of affected engine . . . . . ON, propeller un-feathers
6. STARTER of affected engine . . . . . engage when propeller is stationary

### CAUTION

After the engine has started, the POWER lever should be set to a moderate power setting until engine temperatures have reached the green range.

**END OF CHECKLIST**



**NOTE**

Below 125 KIAS it is possible that the propeller may not windmill continuously. Continuous windmilling is required for a successful restart. Above 145 KIAS a restart can overspeed the propeller.

1. POWER lever of affected engine . . . . . IDLE
2. FUEL SELECTOR of affected engine . . . . . check ON
3. Alternate air . . . . . as required
4. ALTERNATOR of affected engine . . . . . ON
5. ENGINE MASTER of affected engine . . . . . ON, propeller un-feathers and  
restarts by windmilling

**CAUTION**

After the engine has started, the POWER lever should be set to a moderate power setting until engine temperatures have reached the green range.

**END OF CHECKLIST**

### 3.7.5 ENGINE FAILURE DURING TAKE-OFF

#### a) Engine Failure During Ground Roll

- Abort take-off

1. POWER lever ..... IDLE / BOTH
2. Rudder ..... maintain directional control
3. Brakes ..... as required

### **CAUTION**

If sufficient time is remaining, the risk of fire in the event of a collision with obstacles can be reduced as follows:

4. ENGINE MASTER ..... both OFF
5. FUEL SELECTOR ..... both OFF
6. ELECT. MASTER ..... OFF

**END OF CHECKLIST**



b) Engine Failure After Lift Off

*If the landing gear is still extended and the remaining runway / surface is adequate:*

- abort the take-off & land straight ahead

*If the remaining runway / surface is inadequate:*

- decide whether to abort or to continue the take-off

*Continued take-off:*

**WARNING**

A continued take-off is not recommended if the steady rate of climb according to Section 5.3.8 - ONE ENGINE INOPERATIVE CLIMB PERFORMANCE is less than 3.3 %. Under certain combinations of ambient conditions, such as turbulence, crosswinds and wind shear as well as pilot skill the resulting climb performance may nevertheless be insufficient to continue the take-off successfully. Therefore a continued take-off with a failed engine has to be avoided if at all possible.

1. POWER lever ..... MAX
2. Rudder ..... maintain directional control
3. Airspeed .....  $V_{YSE} = 85$  KIAS / as required
4. Landing gear ..... UP to achieve a positive ROC
5. FLAPS ..... check UP

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6. Inoperative engine . . . . . secure according to  
3.7.3 - ENGINE SECURING  
(FEATHERING) PROCEDURE

Land as soon as possible according to 3.7.7 - LANDING WITH ONE ENGINE INOPERATIVE. If a diversion is required before landing continue according to Section 3.7.9 - FLIGHT WITH ONE ENGINE INOPERATIVE.

**END OF CHECKLIST**

**3.7.6 ENGINE FAILURES IN FLIGHT**

(a) Engine Failure During Initial Climb

**WARNING**

As the climb is a flight condition which is associated with high power settings, airspeeds lower than  $v_{MCA} = 76$  KIAS should be avoided as a sudden engine failure can lead to loss of control. In this case it is very important to reduce the asymmetry in thrust to regain directional control.

- 1. Rudder ..... maintain directional control
- 2. Airspeed .....  $v_{YSE} = 85$  KIAS/  
above  $v_{MCA} = 76$  KIAS as required
- 3. Operative engine ..... increase power as required if  
directional control has been  
established

Establish minimum / zero sideslip condition. (approx. half ball towards good engine; 3° to 5° bank)

- 4. Inoperative engine ..... Secure according to 3.7.3 -  
ENGINE SECURING  
(FEATHERING) PROCEDURE

Land as soon as possible according to 3.7.7 - LANDING WITH ONE ENGINE INOPERATIVE. If a diversion is required before landing continue according to Section 3.7.9 - FLIGHT WITH ONE ENGINE INOPERATIVE.

**END OF CHECKLIST**

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(b) Engine Failure During Flight

1. Rudder ..... maintain directional control
2. Airspeed ..... as required /  
above  $v_{MCA} = 76$  KIAS
3. Operative engine ..... increase power up to 92% load  
or maximum 2100 RPM

Establish minimum / zero sideslip condition. (approx. half ball towards good engine;  
3° to 5° bank)

4. Inoperative engine ..... Secure according to 3.7.3 -  
ENGINE SECURING  
(FEATHERING) PROCEDURE.

Land as soon as possible according to 3.7.7 - LANDING WITH ONE ENGINE  
INOPERATIVE. If a diversion is required before landing continue according to Section  
3.7.9 - FLIGHT WITH ONE ENGINE INOPERATIVE.

**END OF CHECKLIST**

**3.7.7 LANDING WITH ONE ENGINE INOPERATIVE**

*Preparation:*

**CAUTION**

For emergency landing the adjustable backrests (if installed) must be fixed in the upright position.

- 1. Adjustable backrests (if installed) . . . . . adjust to the upright position described by a placard on the roll-over bar and verify proper fixation
- 2. Safety harnesses . . . . . check fastened & tightened
- 3. Landing light . . . . . as required
- 4. Gear warning horn . . . . . check function

*Operative engine:*

- 5. Fuel pump remaining engine . . . . . ON
- 6. FUEL SELECTOR . . . . . check ON

**CAUTION**

Switching on the fuel pump in combination with CROSSFEED may cause damage to the high-pressure pump.

**CAUTION**

If CROSSFEED is necessary with pumps ON, special maintenance is required before next flight.

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*Inoperative engine:*

7. Engine ..... check secured (feathered)  
according to 3.7.3 - ENGINE  
SECURING & FEATHERING  
PROCEDURE

*not before being certain of "making the field":*

8. Airspeed ..... as required to operate landing  
gear
9. Landing gear ..... DOWN, check 3 green
10. Trim ..... as required
11. Airspeed ..... reduce as required
12. FLAPS ..... as required
13. Final approach speed ..... 86 KIAS ( $V_{REF}$ /FLAPS UP)  
84 KIAS ( $V_{REF}$ /FLAPS APP)  
84 KIAS ( $V_{REF}$ /FLAPS LDG)

**WARNING**

One-engine inoperative approaches for landing with flap settings of more than flaps UP are not recommended unless a safe landing is assured („Making the field“). Higher flap settings increase the loss of altitude during the transition to a one engine inoperative go-around / bailed landing.

14. POWER lever ..... as required
15. Trim ..... as required / directional trim to  
neutral

**CONTINUED**

**NOTE**

Higher approach speeds result in a significantly longer landing distance during flare.

**CAUTION**

In conditions such as (e.g.) strong wind, danger of wind shear or turbulence a higher approach speed should be selected.

- Perform normal touchdown and deceleration on ground.

**END OF CHECKLIST**

*If the approach to land is not successful you may consider:*

### **3.7.8 GO-AROUND / BALKED LANDING WITH ONE ENGINE INOPERATIVE**

#### **CAUTION**

The go-around / balked landing is not recommended to be initiated below a minimum of 800 ft above ground.

For performance data with one engine inoperative and flaps and gear UP refer to 5.3.8 - ONE ENGINE INOPERATIVE CLIMB PERFORMANCE.

Under certain combinations of ambient conditions, such as turbulence, cross wind and windshear, as well as pilot skill, the resulting climb performance may nevertheless be insufficient for a successful go-around / balked landing.

- 14. POWER lever ..... MAX
- 15. Rudder ..... maintain directional control
- 16. Airspeed .....  $V_{YSE} = 85$  KIAS / as required
- 17. Landing gear ..... UP / retract
- 18. FLAPS ..... UP

- Establish minimum sideslip and manoeuvre for a new attempt to land. Repeat from step 1 of section 3.7.9 - FLIGHT WITH ONE ENGINE INOPERATIVE.

**CONTINUED**



*If a positive rate of climb cannot be established:*

- Land so as to keep clear of obstacles with the landing gear extended.

*If time allows the following steps can reduce the risk of fire in an event of collision with obstacles after touchdown:*

- 19. ENGINE MASTER ..... both OFF
- 20. FUEL SELECTOR ..... both OFF
- 21. ELECT. MASTER ..... OFF

**END OF CHECKLIST**

### 3.7.9 FLIGHT WITH ONE ENGINE INOPERATIVE

#### CAUTION

Even if a positive flight performance can be established with one engine inoperative, land as soon as possible at the next suitable airfield / airport.

1. Airspeed ..... above  $v_{MCA} = 76$  KIAS to  
maintain directional control
2. Remaining engine ..... monitor engine instruments  
continuously
3. Fuel quantity ..... monitor continuously
4. Fuel pump LH/RH ..... check OFF
5. FUEL SELECTOR ..... remaining engine / set  
CROSSFEED or ON so as to  
keep fuel quantity laterally  
balanced

#### CAUTION

Switching the fuel pump to ON in combination with CROSSFEED may cause damage to the high-pressure pump.

CONTINUED

**NOTE**

If the FUEL SELECTOR is set on CROSSFEED, the engine will be supplied with fuel from the main tank on the opposite side.

This will extend range and helps to keep the wings laterally balanced (see 2.14 - FUEL).

Land as soon as possible according to Section 3.7.7 - LANDING WITH ONE ENGINE INOPERATIVE.

**END OF CHECKLIST**

### **3.8 LANDING GEAR SYSTEM FAILURES**

#### **3.8.1 LANDING GEAR UNSAFE WARNING**

##### **NOTE**

The landing gear unsafe warning light illuminates if the landing gear is neither in the final up or down & locked position. Illumination of this light is therefore normal during transit.

*If the light remains on for longer than 20 seconds during landing gear retraction / extension:*

1. Airspeed ..... check below  $v_{LOR} = 152$  KIAS
2. Gear selector ..... re-cycle if continued illumination occurs

*If the landing gear cannot be extended to the down & locked position or red light does not extinguish:*

- Continue with 3.8.2 - MANUAL EXTENSION OF THE LANDING GEAR.

**CONTINUED**

**NOTE**

If the landing gear cannot be retracted to the final up position you may continue the flight with the landing gear extended in the down & locked position. Consider for higher aerodynamic drag, resulting in degraded flight performance, increased fuel consumption and decreased range.

With the landing gear extended and at aft CG-locations, with flaps up and full power applied, the airplane will easily recover from sideslip if the trim is set to neutral (normal procedure). Otherwise it may require corrective action with a moderate amount of rudder input.

In cold ambient temperatures it may help to reduce the airspeed below 110 KIAS for landing gear operation.

**END OF CHECKLIST**

### **3.8.2 MANUAL EXTENSION OF THE LANDING GEAR**

#### **NOTE**

In case of a failure of the electrical pump, which is driving the landing gear actuators, the landing gear can be extended manually at speeds up to 152 KIAS. The manual extension of the landing gear may take up to 20 seconds.

*The following checks shall be completed before extending the landing gear manually:*

1. Gear indicator lights . . . . . test / push test button
2. ELECT. MASTER . . . . . check ON
3. Bus voltage . . . . . check in normal range
4. Circuit breaker . . . . . check in / reset if necessary

*Manual landing gear extension procedure:*

5. Gear selector . . . . . select DOWN
6. Manual gear extension handle . . . . . pull out

#### **NOTE**

The landing gear should now extend by gravity and relief of hydraulic pressure from the system. If one or more landing gear indicator lights do not indicate the gear down & locked after completion of the manual extension procedure steps 1 - 6 reduce airspeed below 110 KIAS and apply moderate yawing and pitching to bring the landing gear into the locked position.

**CONTINUED**

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7. Gear indicator lights ..... check 3 green lights

**NOTE**

If the landing gear is correctly extended and locked, as indicated by the 3 green lights, the red light is illuminated additionally if the GEAR circuit breaker is pulled.

If the landing gear cannot be extended to the down & locked position continue according to 3.8.3 - LANDING WITH GEAR UP.

**END OF CHECKLIST**

### 3.8.3 LANDING WITH GEAR UP

#### NOTE

This procedure applies if the landing gear is completely retracted.

1. Approach ..... with power at normal approach  
airspeeds and flap settings
2. POWER lever ..... IDLE / just before  
touchdown

*If the time / situation allows, the following steps can help to reduce the risk of fire:*

3. ENGINE MASTER ..... both OFF
4. Fuel pumps ..... check OFF
5. FUEL SELECTOR ..... both OFF
6. ELECT. MASTER ..... OFF

*Touchdown:*

7. Touchdown ..... contact surface with minimum  
airspeed
8. On ground ..... maintain directional control with  
rudder as long as possible so as  
to avoid collision with obstacles

**END OF CHECKLIST**



**3.8.4 LANDING WITH A DEFECTIVE TIRE ON THE MAIN LANDING GEAR****CAUTION**

A defective (e.g. burst) tire is not usually easy to detect. The damage normally occurs during take-off or landing, and is hardly noticeable during fast taxiing. It is only during the roll-out after landing or at lower taxiing speeds that a tendency to swerve occurs. Rapid and determined action is then required.

1. Land the airplane at the edge of the runway that is located on the side of the intact tire, so that changes in direction which must be expected during roll-out due to the braking action of the defective tire can be corrected on the runway.
2. Land with one wing low. The wing on the side of the intact tire should be held low.
3. Direction should be maintained using the rudder. This should be supported by use of the brake. It is possible that the brake must be applied strongly - if necessary to the point where the wheel locks. The wide track of the landing gear will prevent the airplane from tipping over a wide speed range. There is no pronounced tendency to tip even when skidding.

**END OF CHECKLIST**

### **3.8.5 LANDING WITH DEFECTIVE BRAKES**

Consider the greater rolling distance.

Safety harness ..... check fastened and tightened

#### **CAUTION**

If sufficient time is remaining, the risk of fire in the event of a collision can be reduced as follows after a safe touch-down:

- ENGINE MASTER ..... both OFF
- FUEL SELECTOR ..... both OFF
- ELECT. MASTER ..... OFF

**END OF CHECKLIST**

**3.9 FAILURES IN THE ELECTRICAL SYSTEM**

**3.9.1 COMPLETE FAILURE OF THE ELECTRICAL SYSTEM**

- 1. Circuit breakers ..... check if all OK (pressed in)

*if there is still no electrical power available:*

- 2. EMERGENCY SWITCH ..... ON
- 3. Flood light, if necessary ..... ON
- 4. POWER ..... set based on lever positions  
and engine noise
- 5. Prepare landing with flaps in the given position. Refer to 4B.5 - FAILURES IN  
FLAP OPERATING SYSTEM.
- 6. Land on the nearest suitable airfield.

**WARNING**

Engine stoppage may occur, depending on the failure mode. Backup batteries are installed for the ECUs to provide electrical power solely to the ECU and their systems for at least 30 minutes.

**NOTE**

The landing gear uplock is no longer ensured. The landing gear may slowly extend.

The landing gear can be extended manually according to 3.8.2 - MANUAL EXTENSION OF THE LANDING GEAR.

**NOTE**

The backup artificial horizon and the flood light will have electrical power for at least 1.5 hours.

**CONTINUED**

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Make use of the stand-by airspeed indicator and altimeter. Engine power can be set via visual reference of the POWER lever position.

**END OF CHECKLIST**

**3.9.2 HIGH CURRENT**

*If high current is indicated on the G1000:*

1. Circuit breakers . . . . . check
2. Reduce electric load to minimum required for continued safe flight.
3. Land on the nearest suitable airfield.

**END OF CHECKLIST**

**3.9.3 STARTER MALFUNCTION**

*If the starter does not disengage from the engine after starting (starter engaged warning (STARTER L/R) on the G1000 annunciator field illuminates after the engine has started):*

On Ground:

1. POWER lever affected engine . . . . . IDLE
2. ENGINE MASTER affected engine . . . . . OFF
3. ELECT. MASTER . . . . . OFF

Terminate flight preparation.

In flight:

Terminate flight.

**END OF CHECKLIST**

**3.10 SMOKE AND FIRE**

**NOTE**

The cabin hand fire extinguisher is located inside the airplane passenger compartment on the RH side of the cabin floor behind the co-pilot seat.

To release the fire extinguisher bottle out of the bracket, it is necessary to catch the bottle at the agent-outlet nozzle near the Y-spring.

**3.10.1 ENGINE FIRE ON GROUND**

- 1. ENGINE MASTER ..... both OFF
- 2. FUEL SELECTOR ..... both OFF
- 3. ELECT. MASTER ..... OFF

*after standstill:*

- 4. Canopy ..... open
- 5. Airplane ..... evacuate immediately

**END OF CHECKLIST**

**3.10.2 ENGINE FIRE DURING TAKE-OFF**

1. Cabin heat & Defrost . . . . . OFF

**CAUTION**

In case of extreme smoke development, the front canopy may be unlatched during flight. This allows it to partially open, in order to improve ventilation. The canopy will remain open in this position. Flight characteristics will not be affected significantly.

Proceed according to 3.7.5 - ENGINE FAILURES DURING TAKE-OFF.

**END OF CHECKLIST**

**3.10.3 ENGINE FIRE IN FLIGHT**

1. Cabin heat & Defrost ..... OFF

**CAUTION**

In case of extreme smoke development, the front canopy may be unlatched during flight. This allows it to partially open, in order to improve ventilation. The canopy will remain open in this position. Flight characteristics will not be affected significantly.

Proceed according to 3.7.6 - ENGINE FAILURES IN FLIGHT and shut down the engine according to 3.7.3 - ENGINE SECURING (FEATHERING) PROCEDURE.

**END OF CHECKLIST**

**3.10.4 ELECTRICAL FIRE ON GROUND**

1. ELECT. MASTER ..... OFF

*If the engine is running:*

2. POWER lever ..... both IDLE
3. ENGINE MASTER ..... both OFF
4. FUEL SELECTOR ..... both OFF

*When the engine has stopped / after standstill:*

5. Canopy ..... open
6. Airplane ..... evacuate immediately

**END OF CHECKLIST**



**3.10.5 ELECTRICAL FIRE IN FLIGHT**

- 1. EMERGENCY SWITCH ..... ON
- 2. AVIONIC MASTER ..... OFF
- 3. ELECT. MASTER ..... OFF
- 4. Cabin heat & Defrost ..... OFF
- 5. Emergency windows ..... open if required
- 6. Land at the next suitable airfield

**CAUTION**

Switching OFF the ELECT. MASTER will lead to total failure of all electronic and electric equipment. The attitude and heading reference system (AHRS) will also be affected.

However, by switching the EMERGENCY switch ON, the emergency battery will supply power to the standby attitude gyro (artificial horizon) and the flood light.

In case of extreme smoke development, the front canopy may be unlatched during flight. This allows it to be partially opened, in order to improve ventilation. The canopy will remain open in this position. Flight characteristics will not be affected significantly.

The maximum demonstrated airspeed for emergency opening the front canopy in flight is 117 KIAS. Do not exceed 117 KIAS.

**END OF CHECKLIST**

### **3.11 OTHER EMERGENCIES**

#### **3.11.1 SUSPICION OF CARBON MONOXIDE CONTAMINATION IN THE CABIN**

Carbon monoxide (CO) is a gas which is developed during the combustion process. It is poisonous and without smell. Increased concentration of carbon monoxide gas can be fatal. The occurrence of CO in the cabin is possible only due to a defect. If a smell similar to exhaust gases is noticed in the cabin, the following measures should be taken:

1. Cabin heat & Defrost . . . . . OFF
2. Ventilation . . . . . open
3. Emergency windows . . . . . open
4. Forward canopy . . . . . unlatch, push up and lock in  
"cooling-gap" position

#### **CAUTION**

The maximum demonstrated airspeed for emergency opening the front canopy in flight is 117 KIAS. Do not exceed 117 KIAS.

**END OF CHECKLIST**

**3.11.2 UNLOCKED DOORS**

1. Airspeed ..... reduce
2. Canopy ..... check visually if closed
3. Rear passenger door ..... check visually if closed
4. Front baggage doors ..... check visually if closed

**WARNING**

Never unlock the rear passenger door during flight. It may break away.

5. If it is not possible to lock the canopy or the rear passenger door, or if one or both of the front baggage doors are open, land on the nearest suitable airfield.

**END OF CHECKLIST**

**3.11.3 DEFECTIVE PROPELLER RPM REGULATING SYSTEM**

**CAUTION**

The POWER lever should be moved slowly, in order to avoid over-speeding and excessively rapid RPM changes. The light wooden propeller blades produce more rapid RPM changes than metal blades.

**WARNING**

In case of a malfunction of the engine control unit it is possible that the propeller blades will remain in the position of highest pitch. In this case the reduced engine performance should be taken into consideration.

(a) Oscillating RPM

1. POWER setting ..... change

*If the problem does not clear:*

2. Garmin G1000 ..... check L/R ECU A/B FAIL caution

*if L/R ECU A FAIL indicated:*

3. VOTER switch ..... ECU B

*if L/R ECU B FAIL indicated:*

3. VOTER switch ..... ECU A

**NOTE**

If the problem does not clear itself, switch back to AUTO and land on the nearest suitable airfield.

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(b) Propeller Overspeed

**NOTE**

This procedure applies for continued propeller overspeed due to a malfunction in the propeller constant speed unit or a engine control unit malfunction.

- 1. POWER setting ..... reduce as required

*If the problem does not clear:*

- 2. Garmin G1000 ..... check L/R ECU A/B FAIL caution

*if L/R ECU A FAIL indicated:*

- 3. VOTER switch ..... ECU B

*if L/R ECU B FAIL indicated:*

- 3. VOTER switch ..... ECU A

**CAUTION**

If the problem does not clear itself, switch back to AUTO and land on the nearest suitable airfield. Prepare for engine malfunction according to 3.7.6 - ENGINE FAILURES IN FLIGHT.

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(c) Fixed RPM

1. POWER setting ..... change

*If the problem does not clear:*

2. Garmin G1000 ..... check L/R ECU A/B FAIL caution

*if L/R ECU A FAIL indicated:*

3. VOTER switch ..... ECU B

*if L/R ECU B FAIL indicated:*

3. VOTER switch ..... ECU A

**NOTE**

If the problem does not clear itself, switch back to AUTO and land on the nearest suitable airfield.

**END OF CHECKLIST**

**3.11.4 UNINTENTIONAL FLIGHT INTO ICING**

- 1. Leave the icing area (by changing altitude or turning back, in order to reach zones with a higher ambient temperature).
- 2. PITOT HEAT ..... ON
- 3. Cabin heat & Defrost ..... ON
- 4. POWER lever ..... increase power, in order to prevent ice build up on the propeller blades, apply power changes periodically.
- 5. ALTERNATE AIR ..... OPEN
- 6. Emergency windows ..... open if required

**CAUTION**

Ice build-up increases the stalling speed.

- 7. ATC ..... advise if an emergency is expected

**END OF CHECKLIST**

**3.11.5 FUEL SUPPLY FAILURE**

1. FUEL SELECTOR ..... CROSSFEED /  
affected engine

**WARNING**

In case of a fuel supply failure a fuel pump inspection is required prior to the next flight.

2. Fuel quantity ..... monitor
3. Fuel pump of affected engine ..... ON

If fuel supply failure remains:

4. FUEL SELECTOR ..... ON
5. Fuel pump of affected engine ..... ON
6. Fuel quantity ..... monitor

**CAUTION**

Switching on the fuel pump in combination with CROSSFEED may cause damage to the high-pressure pump.

**END OF CHECKLIST**



**3.11.6 RECOVERY FROM AN UNINTENTIONAL SPIN**

**CAUTION**

Spin recovery has NOT been shown during certification as it is NOT required for this airplane category. The given recovery method is based on general experience!

**CAUTION**

Intentional spins are prohibited in this airplane. In the event a spin is encountered unintentionally, immediate recovery actions must be taken.

Single-engine stalling is not permitted.

**CAUTION**

Steps 1 to 4 must be carried out **immediately** and **simultaneously**.

- 1. POWER lever ..... IDLE
- 2. Rudder ..... full deflection against  
direction of spin
- 3. Elevator (control stick) ..... fully forward
- 4. Ailerons ..... neutral
- 5. FLAPS ..... UP

**CONTINUED**

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*When rotation has stopped:*

6. Rudder ..... neutral
7. Elevator (control stick) ..... pull carefully
8. Return the airplane from a descending into a normal flight attitude. Do not exceed the 'never exceed speed',  $v_{NE} = 188$  KIAS.

**END OF CHECKLIST**

### **3.11.7 EMERGENCY DESCENT**

1. FLAPS ..... UP
2. Gear ..... DOWN
3. POWER lever ..... IDLE
4. Airspeed ..... as required

### **WARNING**

Max. structural cruising speed .....  $v_{NO} = 151$  KIAS.

Never exceed speed in smooth air ....  $v_{NE} = 188$  KIAS.

**END OF CHECKLIST**

### **3.11.8 EMERGENCY EXIT**

In case of a roll over of the airplane on ground, the rear side door can be used as exit. For this purpose unlock the front hinge of the rear side door. The function is displayed on a placard beside the hinge.

### **3.11.9 AUTOPILOT OR ELECTRIC TRIM MALFUNCTION / FAILURE**

#### **NOTE**

An autopilot or electric trim malfunction may be recognized by an unexpected deviation from the desired flight path, abnormal flight control or trim wheel movement, or flight director commands which cause unexpected or contradictory information on the other cockpit displays. It may be accompanied by the aural autopilot disconnect tone, a red AFCS, red PTCH, red ROL, red YAW, red AP or yellow AP indication on the PFD, or a yellow CHECK ATTITUDE on the PFD. The autopilot and AHRS monitors normally detect failures and automatically disconnect the autopilot.

Failure of the electric pitch trim, indicated by a red boxed PTRM flashing on the PFD, may not cause the autopilot to disconnect. Be alert to possible autopilot out of trim conditions (see AUTOPILOT OUT OF TRIM procedure below), and expect residual control forces upon disconnect. The autopilot will not re-engage after disconnect with failed pitch trim. If AUTOPILOT OUT OF TRIM ELE indication is present, expect substantial elevator forces on autopilot disconnect.

**NOTE**

Accomplish items 1 and 2 simultaneously!

- 1. Airplane control stick ..... grasp firmly and regain airplane control
- 2. AP DISC switch ..... DEPRESS AND HOLD
- 3. Trim ..... retrim airplane manually as required
- 4. AUTOPILOT circuit breaker ..... pull
- 5. AP DISC switch ..... RELEASE

**NOTE**

When the AUTOPILOT circuit breaker is pulled, the manual electric trim and autopilot autotrim systems will be disabled.

**WARNING**

Do not attempt to re-engage the autopilot following an autopilot, autotrim, or manual electric trim malfunction until the cause for the malfunction has been corrected.

**END OF CHECKLIST**

Intentionally left blank.

## CHAPTER 4A

# NORMAL OPERATING PROCEDURES

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## **4A.1 INTRODUCTION**

Chapter 4A contains checklists and describes procedures for the normal operation of the airplane.

### **NOTE**

Readability of the G1000 PFD and MFD displays may be degraded when wearing polarized sunglasses.

### **NOTE**

Normal operating procedures for GFC 700 are described in the Garmin G1000 Cockpit Reference Guide, P/N 190-00963-00 or later and the Garmin G1000 Pilot's Guide for the Diamond DA 42 NG, P/N 190-00962-00 or later.

## 4A.2 AIRSPEEDS FOR NORMAL OPERATING PROCEDURES

	FLAPS	Speed
Airspeed for rotation (take-off run, $v_R$ )	UP	min. 80 KIAS
Airspeed for take-off climb (best rate-of-climb speed $v_Y$ )	UP	min. 90 KIAS
Airspeed for best angle of climb	UP	90 KIAS
Airspeed for cruise climb	UP	min. 90 KIAS
Reference landing approach speed	UP	86 KIAS
	APP	min. 84 KIAS
Final approach speed	LDG	min. 84 KIAS
Minimum speed during go around	UP	min. 90 KIAS
Max. structural cruising speed Do not exceed this speed except in smooth air, and then only with caution.	UP	151 KIAS

### **4A.3 ADVISORY ALERTS ON THE G1000**

The G1000 provides the following advisory-alerts on the PFD in the alert area:

#### **4A.3.1 ADVISORY/GENERAL**

<b>CHARACTERISTICS</b>	White color coded text
------------------------	------------------------

#### **4A.3.2 L/R GLOW ON**

<b>L/R GLOW ON</b>	Left / Right engine glow plug active
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#### **4A.3.3 L/R AUXPUMP ON**

<b>L/R AUXPUMP ON</b>	Fuel transfer from auxiliary to main tank is in progress (if installed)
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#### **4A.3.4 PFD/MFD/GIA FAN FAIL**

<b>PFD FAN FAIL</b>	Cooling fan for the PFD is inoperative
<b>MFD FAN FAIL</b>	Cooling fan for the MFD is inoperative
<b>GIA FAN FAIL</b>	Cooling fan for the GIA is inoperative

The flight may be continued, but maintenance action is required after landing.

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#### **4A.4 FLIGHT CHARACTERISTICS**

The DA 42 NG is to be flown with "the feet on the pedals", meaning that coordinated flight in all phases and configurations shall be supported by dedicated use of the rudder and ailerons together.

With the landing gear extended and at aft CG-locations, with flaps up and full power applied, the airplane will easily recover from sideslip if the trim is set to neutral (normal procedure), otherwise it may require corrective action with a moderate amount of rudder input.

#### **4A.5 DAILY CHECK**

Before the first flight of a day it must be ensured that the following checks are performed.

- \* On-condition check of the canopy, the side door and the baggage compartment doors for cracks and major scratches.
- \* On-condition check of the hinges for the canopy, the side door and the baggage compartment doors.
- \* Visual inspection of the locking bolts for proper movement with no backlash.
- \* Tire inflation pressure check (main wheels: 4.7 bar / 68 psi, nose wheel: 6.0 bar / 87 psi).
- \* Visual inspection of both spinners and their attachment.

## **4A.6 CHECKLISTS FOR NORMAL OPERATING PROCEDURES**

### **4A.6.1 PRE-FLIGHT INSPECTION**

#### I. Cabin check

##### *Preparation:*

- a) Parking brake . . . . . set ON
- b) MET, NAV, mass and balance . . . . . flight planning completed
- c) Airplane documents . . . . . complete and up to date
- d) Front canopy and rear door . . . . . clean, undamaged, check  
locking mechanism function
- e) Baggage . . . . . stowed and secured
- f) Foreign objects . . . . . check

##### *Center console:*

- a) FUEL SELECTOR . . . . . check ON
- b) POWER lever . . . . . check condition, freedom of  
movement and full travel/  
adjust friction, set IDLE

##### *Below instrument panel in front of left seat:*

- a) ALTERNATE STATIC SOURCE . . . . . check CLOSED
- b) Manual gear extension handle . . . . . check pushed in

##### *Below instrument panel in front of right seat:*

- a) ALTERNATE AIR . . . . . check CLOSED

**CONTINUED**

*On the instrument panel:*

- a) ALTERNATOR ..... check ON
- b) VOTER switch ..... check AUTO
- c) PITOT HEAT ..... check OFF
- d) ENGINE MASTER ..... check both OFF
- e) START KEY ..... check key is pulled out
- f) ELECT. MASTER ..... check OFF
- g) AVIONIC MASTER ..... check OFF
- h) GEAR SELECTOR ..... check DOWN
- i) FLAP SELECTOR ..... check UP
- j) Circuit breakers ..... set in (if one has been pulled,  
check reason)
- k) All electrical equipment ..... OFF
- l) EMERGENCY switch ..... check OFF and guarded
- m) ELT ..... armed

Check procedure:

- a) ELECT. MASTER ..... ON

### CAUTION

When switching the ELECT. MASTER ON, the electrically driven hydraulic gear pump may activate itself for 5 to 20 seconds in order to restore the system pressure. Should the pump continue to operate continuously or periodically, terminate flight. There is a malfunction in the landing gear system.

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- b) Fuel quantity ..... check indication, verify using alternate means (see Section 7.9.5)
- c) Position lights, strobe lights (ACL) ..... check for correct function

**CAUTION**

Do not look directly into the anti collision lights.

- d) Landing / taxi light ..... check for correct function
- e) Stall warning / stall heat / Pitot heat ..... check

**NOTE**

Because the stall warning switch gets slightly warmer on ground, STAL HT FAIL may be indicated on the PFD.

- f) Gear warning / fire detector TEST BUTTON ..... PUSH, check aural alert/fire detection warning and aural alert and CHECK GEAR caution

**CAUTION**

If the aural alert or the warning on the PFD does not appear, terminate flight. Unscheduled maintenance is necessary.

- g) Control stick ..... pull fully aft/hold at backstop

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- h) FLAPS ..... set LDG position
- i) POWER lever ..... set MAX
- j) Variable elevator backstop ..... check function/control stick must  
move slightly forward during  
power lever forward movement
- k) POWER lever ..... set IDLE
- l) Variable elevator backstop ..... check function/control stick must  
regain full movement during  
power lever retraction

Repeat the variable elevator backstop checks with FLAPS set to APP and UP.

- m) FLAPS ..... set UP position

### CAUTION

The proper function of the variable elevator backstop is indispensable for the safety of flight, as the handling qualities during power-on stalls are degraded significantly. For more details see Chapter 7 - AIRPLANE DESCRIPTION AND SYSTEMS.

If the variable elevator backstop does not function properly, terminate flight preparation.

- n) ELECT. MASTER ..... OFF
- o) Flight controls ..... check free and correct movement  
up to full deflection
- p) Trims ..... check free and correct movement  
up to full deflection

### END OF CHECKLIST

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II. Walk-around check, visual inspection

**CAUTION**

A visual inspection means: examination for damage, cracks, delamination, excessive play, load transmission, correct attachment and general condition. In addition control surfaces should be checked for freedom of movement.

**CAUTION**

In low ambient temperatures the airplane must be completely cleared of ice, snow and similar accumulations. For approved de-icing fluids refer to Section 8.7 - GROUND DE-ICING.

**CAUTION**

Prior to flight, remove such items as control surfaces gust lock, Pitot cover, tow bar, etc.

1. *Left main landing gear:*

- a) Landing gear strut and lock . . . . . visual inspection, sufficient height  
(typical visible length of bare piston: at least 4 cm/1.6 in)
- b) Down and uplock switches (2x) . . . . . visual inspection
- c) Wear, tread depth of tire . . . . . visual inspection
- d) Tire, wheel, brake . . . . . visual inspection
- e) Brake line connection . . . . . check for leaks
- f) Slip marks . . . . . visual inspection
- g) Chocks . . . . . remove
- h) Landing gear door . . . . . visual inspection

**CONTINUED**

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2. *Left engine nacelle:*

- a) 3 air inlets / 2 air outlets ..... clear
- b) Engine oil level ..... check dipstick (inspection hole in the upper cowling)
- c) Gearbox oil level ..... check visually (inspection hole in the lower cowling)
- d) Cowling ..... visual inspection
- e) Gascolator / air inlet ..... drain off to check for water and sediment (drain until no water comes out)/clear
- f) Venting pipe ..... check for blockage
- g) Exhaust ..... visual inspection

**WARNING**

The exhaust can cause burns when hot.

- h) Propeller ..... visual inspection

**WARNING**

Never move the propeller by hand while the ENGINE MASTER switch is ON! Also do not move the propeller by hand while the ENGINE MASTER is OFF immediately after operation (remaining pressure in the injection system rail). Serious personal injury may result.

- i) De-icing boots (if OÄM 42-053 carried out) . . check for de-bonding

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- j) Nacelle underside . . . . . check for excessive contamination particularly by oil, fuel, and other fluids
- k) Auxiliary tank vent outlet on lower surface (if installed) . . . . . visual inspection
- l) Auxiliary tank drain (if installed) . . . . . drain off to check for water and sediment (drain until no water comes out) / visual inspection
- m) Auxiliary tank filler (if installed) . . . . . visual inspection, tank filler closed

3. *Left wing:*

- a) Entire wing surface . . . . . visual inspection
- b) Vortex generators . . . . . undamaged, 4 pieces, clean
- c) Tank air outlet on lower surface . . . . . visual inspection
- d) Tank drain/tank air inlet . . . . . drain off to check for water and sediment (drain until no water comes out)/visual inspection
- e) Openings on lower surface . . . . . check for foreign objects and for traces of fuel (if tank is full, fuel may spill over through the tank vent)
- f) Stall warn device . . . . . visual inspection
- g) Tank filler . . . . . visual inspection, check closed
- h) Pitot probe . . . . . clean, orifices clear, cover removed, no deformation
- i) Wing tip . . . . . visual inspection
- j) Static dischargers . . . . . visual inspection
- k) Position light, strobe light (ACL) . . . . . visual inspection
- l) Tie-down . . . . . check, clear

**CONTINUED**

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- m) Aileron and linkage . . . . . visual inspection
- n) Aileron hinges and safety pin . . . . . visual inspection
- o) Foreign objects in aileron paddle . . . . . visual inspection
- p) Flap and linkage . . . . . visual inspection
- q) Flap hinges and safety pin . . . . . visual inspection
- r) Nacelle underside fuel cooler air in- & outlet . check clear
- s) Step . . . . . visual inspection

**4. Fuselage, left side, underside:**

- a) Canopy, left side . . . . . visual inspection
- b) Rear cabin door & window . . . . . visual inspection
- c) Fuselage skin . . . . . visual inspection
- d) Antennas . . . . . visual inspection
- e) Fuselage . . . . . check for contamination  
(hydraulic fluid)
- f) Static source . . . . . check for blockage

**5. Empennage:**

- a) Stabilizers and control surfaces,  
elevator tips . . . . . visual inspection
- b) Hinges . . . . . visual inspection
- c) Elevator trim tab . . . . . visual inspection, check safetying
- d) Rudder trim tab . . . . . visual inspection, check safetying
- e) Tie-down . . . . . check, clear
- f) Tail skid and lower fin . . . . . visual inspection
- g) Static dischargers . . . . . visual inspection

**CONTINUED**

6. *Fuselage, right side:*

- a) Fuselage skin . . . . . visual inspection
- b) Rear window . . . . . visual inspection
- c) Canopy, right side . . . . . visual inspection
- d) Static source . . . . . check for blockage

7. *Right Main Landing Gear:*

- a) Landing gear strut and lock . . . . . visual inspection, sufficient height  
(typical visible length of bare piston: at least 4 cm/1.6")
- b) Down and uplock switches (2x) . . . . . visual inspection
- c) Wear, tread depth of tire . . . . . visual inspection
- d) Tire, wheel, brake . . . . . visual inspection
- e) Brake line connection . . . . . check for leaks
- f) Slip marks . . . . . visual inspection
- g) Chocks . . . . . remove
- h) Landing gear door . . . . . visual inspection

8. *Right wing:*

- a) Entire wing surface . . . . . visual inspection
- b) Vortex generators . . . . . undamaged, 4 pieces, clean
- c) Tank air outlet on lower surface . . . . . visual inspection
- d) Tank drain/tank air inlet . . . . . drain off to check for water and  
sediment (drain until no water comes out)/visual inspection

**CONTINUED**

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- e) Openings on lower surface . . . . . check for foreign objects and for traces of fuel (if tank is full, fuel may spill over through the tank vent)
- f) Tank filler . . . . . visual inspection, check closed
- g) Wing tip . . . . . visual inspection
- h) Static dischargers . . . . . visual inspection
- i) Position light, strobe light (ACL) . . . . . visual inspection
- j) Tie-down . . . . . check, clear
- k) Aileron and linkage . . . . . visual inspection
- l) Aileron hinges and safety pin . . . . . visual inspection
- m) Foreign objects in aileron paddle . . . . . visual inspection
- n) Flap and linkage . . . . . visual inspection
- o) Flap hinges and safety pin . . . . . visual inspection
- p) Nacelle underside fuel cooler air in- & outlet . check clear
- q) Step . . . . . visual inspection
- r) Cabin vent air inlet . . . . . check clear

9. *Right engine nacelle:*

- a) 3 air inlets / 2 air outlets . . . . . clear
- b) Engine oil level . . . . . check dipstick (inspection hole in the upper cowling)
- c) Gearbox oil level . . . . . check visually (inspection hole in the lower cowling)
- d) Cowling . . . . . visual inspection
- e) Gascolator / air inlet . . . . . drain off to check for water and sediment (drain until no water comes out)/clear

**CONTINUED**

- f) Venting pipe ..... check for blockage
- g) Exhaust ..... visual inspection

**WARNING**

The exhaust can cause burns when hot.

- h) Propeller ..... visual inspection

**WARNING**

Never move the propeller by hand while the ENGINE MASTER switch is ON! Also do not move the propeller by hand while the ENGINE MASTER is OFF immediately after operation (remaining pressure in the injection system rail). Serious personal injury may result.

- i) De-icing boots (if OÄM 42-053 carried out) . check for de-bonding
- j) Nacelle underside ..... check for excessive contamination particularly by oil, fuel, and other fluids
- k) Auxiliary tank vent outlet on lower surface (if installed) ..... visual inspection
- l) Auxiliary tank drain (if installed) ..... drain off to check for water and sediment (drain until no water comes out)/visual inspection
- m) Auxiliary tank filler (if installed) ..... visual inspection, tank filler closed

**CONTINUED**

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10. *Front fuselage and nose landing gear:*

- a) Left and right front baggage door . . . . . visual inspection, closed and locked
- b) Nose landing gear strut . . . . . visual inspection, sufficient height (typical visible length of bare piston: at least 15 cm/5.9 in)
- c) Down & uplock switches . . . . . visual inspection
- d) Wear, tread depth of tire . . . . . check
- e) Slip marks . . . . . visual inspection
- f) Gear door and linkage . . . . . visual inspection
- g) Chocks . . . . . remove
- h) OAT sensor . . . . . check
- i) EPU connector . . . . . check
- j) Tow bar . . . . . remove

**END OF CHECKLIST**



**4A.6.2 BEFORE STARTING ENGINE**

- 1. Preflight inspection ..... complete
- 2. Passengers ..... instructed

**NOTE**

Ensure all the passengers have been fully briefed on the use of the seat belts, doors and emergency exits and the ban on smoking.

- 3. Rear door ..... closed and locked

**CAUTION**

When operating the canopy, pilots/operators must ensure that there are no obstructions between the canopy and the mating frame, for example seat belts, clothing, etc. When operating the locking handle do NOT apply undue force.

A slight downward pressure on the canopy may be required to ease the handle operation.

- 4. Front canopy ..... Position 1 or 2 (“cooling gap”)

**CAUTION**

For take-off the adjustable backrests (if installed) must be fixed in the upright position.

**CONTINUED**

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**NOTE**

The pilot must ensure that a passenger sitting on a front seat is instructed in the operation of the adjustable backrest (if installed).

- 5. Adjustable backrests (if installed) . . . . . adjust to the upright position described by a placard on the roll-over bar and verify proper fixation
- 6. Rudder pedals . . . . . adjusted;  
if manual pedal adjustment is installed: verify proper locking
- 7. Safety harnesses . . . . . all on and fastened
- 8. POWER lever . . . . . check IDLE
- 9. Parking brake . . . . . set
- 10. AVIONIC MASTER . . . . . check OFF
- 11. GEAR selector . . . . . check DOWN
- 12. VOTER switch . . . . . check AUTO
- 13. ALTERNATORS . . . . . check ON
- 14. Fuel pump LH/RH . . . . . check OFF
- 15. ELECT. MASTER . . . . . ON

**CAUTION**

When switching the ELECT. MASTER ON, the electrically driven hydraulic gear pump may activate itself for 5 to 20 seconds in order to restore the system pressure. Should the pump continue to operate continuously or periodically, terminate flight preparation. There is a malfunction in the landing gear system.

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16. G1000 ..... wait until power-up completed.  
Press ENT on MFD to  
acknowledge.

**NOTE**

The engine instruments are only available on the MFD after  
item 16 has been completed.

17. Fuel temperature ..... check

**END OF CHECKLIST**

**4A.6.3 STARTING ENGINE**

**NOTE**

At ambient temperatures below -22°C the engine may not start at the first attempt. In this case wait 60 seconds between the start attempts.

1. Strobe lights (ACL) ..... ON
2. ENGINE MASTER ..... ON (L)
3. Annunciations ..... check "L ENGINE GLOW" ON

**NOTE**

"L ENGINE GLOW" is indicated only when the engine is cold.

4. Annunciations / Engine / System Page ..... check OK/normal range

**WARNING**

Before starting the engine the pilot must ensure that the propeller area is free, and no persons can be endangered.

*After the L ENGINE GLOW indication is extinguished:*

5. START KEY ..... START L as required / release when engine has started.

**CONTINUED**

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**CAUTION**

Do not overheat the starter motor. Do not operate the starter motor for more than 10 seconds.

At ambient temperatures below -22°C it is possible that the engine will not start at the first attempt. In this case wait 60 seconds between the start attempts.

If the "L STARTER" annunciation comes on after the engine has started and the START KEY has been released, set the ENGINE MASTER to OFF and investigate the problem.

- 6. Annunciations / Engine / System Page . . . . . check OK/normal range
- 7. Annunciations / Starter . . . . . check OFF
- 8. Annunciations / Oil pressure . . . . . check OK

**WARNING**

If the oil pressure has not moved from the red range within 3 seconds after starting, set the ENGINE MASTER switch to OFF and investigate problem.

- 9. Circuit breakers . . . . . check all in/as required
- 10. Idle RPM . . . . . check, 740 ±30 RPM

Repeat with opposite engine.

- 11. Warm up . . . . . IDLE for 30 seconds, then  
at 50% load until:  
oil temperature 50°C (122°F) and  
coolant temperature 60 °C (140°F)

**END OF CHECKLIST**

**4A.6.4 BEFORE TAXIING**

1. AVIONIC MASTER ..... ON
2. Electrical equipment ..... ON as required
3. Flight instruments and avionics ..... set as required
4. Flood light ..... ON, test function, as required
5. Pitot and stall warn heating ..... ON, check annunciation

**NOTE**

The stall warning switch gets slightly warmer on ground only and STAL HT FAIL is indicated on the PFD.

6. Pitot and stall warn heating ..... OFF
7. Strobe lights (ACL's) ..... check ON
8. Position lights, landing and taxi lights ..... as required

**CAUTION**

When taxiing at close range to other airplane, or during night flight in clouds, fog or haze, the strobe lights should be switched OFF. The position lights must always be switched ON during night flight.

9. Primary flight display (PFD) ..... NO AUTOPILOT ANNUNCIATIONS
10. Autopilot disconnect tone ..... NOTE

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**NOTE**

The AFCS system automatically conducts a preflight self-test upon initial power application. The preflight test is indicated by a white boxed PFT on the PFD. Upon successful completion of the preflight test, the PFT is removed, the red AFCS annunciation is removed, and the autopilot disconnect tone sounds. If AFCS annunciation remains on or a failure of the preflight test is indicated terminate flight preparation and investigate the problem.

- 11. MANUAL ELECTRIC TRIM - TEST as follows:  
    Press the AP DISC button down and hold while commanding trim.  
    Manual electric trim should not operate either nose up or nose down.
  
- 12. AUTOPILOT ..... engage by pressing AP button
- 13. AP DISC switch ..... press. verify that the autopilot disconnects
- 14. TRIM ..... set to take-off position manually

**END OF CHECKLIST**

**4A.6.5 TAXIING**

1. Parking brake ..... release
2. Brakes ..... test on moving off
3. Nose wheel steering ..... check for proper function
4. Flight instrumentation and avionics ..... check for correct indications
5. Fuel pumps LH/RH ..... check OFF
6. FUEL SELECTOR ..... CROSSFEED (LH/RH)

**CAUTION**

The fuel crossfeed function can be tested simultaneously with both engines. Proper function can be tested by running the engines for approx. 30 seconds with CROSSFEED selected. The operation of both engines with both FUEL SELECTORS in CROSSFEED position, other than for this test, is prohibited.

**CAUTION**

Switching on the fuel pump in combination with CROSSFEED may cause damage to the high-pressure pump.

7. FUEL SELECTOR ..... ON (LH/RH)

**CAUTION**

When taxiing on a poor surface select the lowest possible RPM to avoid damage to the propeller from stones or similar items.

**END OF CHECKLIST**

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**4A.6.6 BEFORE TAKE-OFF**

- 1. Position airplane into wind if possible.
- 2. Parking brake ..... set

**CAUTION**

For take-off the adjustable backrests (if installed) must be fixed in the upright position.

- 3. Adjustable backrests (if installed) ..... verify upright position and proper fixation
- 4. Safety harnesses ..... on and fastened
- 5. Rear door ..... check closed and locked

**CAUTION**

When operating the canopy, pilots/operators must ensure that there are no obstructions between the canopy and the mating frame, for example seat belts, clothing, etc. When operating the locking handle do NOT apply undue force.

A slight downward pressure on the canopy may be required to ease the handle operation.

- 6. Front canopy ..... closed and locked
- 7. Front baggage doors ..... closed (visual check)
- 8. Door warning (DOOR) ..... check no indication

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9. Annunciations / Engine / System Page . . . . . check OK / normal range  
(except oil pressure may be in  
the yellow range with a warm  
engine and power lever set to  
IDLE)
10. Circuit breakers . . . . . check pressed in
11. Longitudinal trim . . . . . set T/O

**WARNING**

Take-off with CROSSFEED selected is prohibited.

12. FUEL SELECTOR . . . . . check ON (LH/RH)
13. Directional trim . . . . . neutral
14. FLAPS . . . . . check function & indicator /  
set UP
15. Flight controls . . . . . unrestricted free movement,  
correct sense
16. Pitot heating . . . . . ON, if required
17. Landing light . . . . . ON, if required

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*ECU / fuel pumps test sequence:*

### **CAUTION**

If the L/R ECU A/B FAIL indicators do not illuminate during the test sequence there is a malfunction in the engine control system. Terminate flight preparation.

The whole test procedure must be completed without any error (L/R ECU A/B FAIL extinguished after test completion). In case the test procedure aborts with an error indication (one or both ECU A/B FAIL indicators remain ON) terminate flight preparation, even if the engine seems to run smoothly after the test procedure.

### **NOTE**

The following test sequence can be executed for both engines simultaneously, or in sequence.

The engine oil temperature has to be in the green range before starting the test sequence.

During the test sequence the engines will produce thrust therefore the parking brake must be set.

Releasing the ECU TEST BUTTON or manipulating the power lever before the test sequence is completed will abort the test sequence.

During the following ECU and fuel pump test, a shake of the engine might occur.

### **CONTINUED**

1. Power lever . . . . . IDLE
2. Propeller RPM . . . . . check below 1000 rpm
3. Fuel pumps . . . . . check OFF
4. VOTER switch . . . . . check AUTO
5. Engine oil temperature . . . . . check in the green range
6. Parking brake . . . . . check set
7. ECU TEST button . . . . . press and hold

Annunciations in the following sequence:

- ECU A/B FAIL lights . . . . . ON
- Propeller RPM . . . . . increase above 1900 rpm
- Propeller RPM . . . . . decrease
- Propeller RPM . . . . . increase to about 1900 rpm
- Propeller RPM . . . . . decrease to idle

At this point, the test transfers from one ECU channel to the other.

- Propeller RPM . . . . . increase above 1900 rpm
- Propeller RPM . . . . . decrease
- Propeller RPM . . . . . increase to about 1900 rpm
- Propeller RPM . . . . . decrease to idle

At this point, control of the engine is returned to the initially active ECU channel. A slight shake of the engine might occur.

- ECU A/B FAIL lights . . . . . both OFF

Test sequence completed.

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- 8. ECU TEST button . . . . . release
- 9. Parking brake . . . . . release

**NOTE**

By switching between ECU A and B the two independent electrical fuel pumps are switched over as well.

- 10. VOTER switch . . . . . ECU A
- 11. Engine . . . . . check running without a change  
(shake may occur)
- 12. VOTER switch . . . . . AUTO
- 13. Engine . . . . . check running without a change  
(shake may occur)
- 14. VOTER switch . . . . . ECU B
- 15. Engine . . . . . check running without a change  
(shake may occur)
- 16. VOTER switch . . . . . AUTO

**CAUTION**

Running the engine with the VOTER switch on ECU A or ECU B, other than for this test or in an emergency is prohibited. The engine control system redundancy is only given with the VOTER switch set to AUTO.

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Available power check:

1. POWER lever ..... MAX for 10 seconds
2. Annunciations ..... check OK / normal range
3. Instruments ..... check within normal range
4. RPM ..... stabilizes at 2250 to 2300 RPM
5. LOAD indication ..... stabilizes at 89% to 100%

**CAUTION**

The load indications in the table below are minimum values to be indicated with the airplane stationary in no wind conditions. If the engine does not stabilize at the target RPM and the required load indication, terminate flight preparation.

Altitude [ft]	OAT								
	-35°C -31°F	-20°C -4°F	-10°C 14°F	0°C 32°F	10°C 50°F	20°C 68°F	30°C 86°F	40°C 104°F	50°C 122°F
0	99%					97%	96%	93%	91%
2000						97%	96%	93%	/
4000						97%	96%	93%	/
6000						97%	96%	93%	/
8000			98%	98%	98%	96%	95%	92%	/
10000	98%	97%	97%	95%	94%	92%	89%	/	/

6. POWER lever ..... IDLE
7. Engine instruments ..... check in green range (except oil pressure may be in yellow range with a warm engine and power lever at IDLE, and fuel temp may be in the low yellow range)
8. Fuel pumps LH/RH ..... ON

**END OF CHECKLIST**

**4A.6.7 TAKE-OFF**

- 1. Transponder ..... as required
- 2. POWER lever ..... MAX

**NOTE**

The proper and symmetric performance of the engines at MAX should be checked early during the take-off run, so that the take-off can be aborted if necessary.

- 3. Elevator ..... neutral
- 4. Rudder ..... maintain direction

**NOTE**

In strong crosswinds steering can be augmented by use of the toe brakes. It should be noted, however, that this method increases the take-off roll, and should not generally be used.

- 5. Nose wheel lift-off: .....  $v_R$  min. 80 KIAS
- 6. Airspeed for initial climb: ..... min. 85 KIAS, recommended  
90 KIAS ( $v_y$ ) when clear of  
obstacles

*When safe climb is established:*

- 7. LANDING GEAR ..... apply brakes; UP,  
check unsafe light off

**NOTE**

To avoid damage and excessive wear of the main landing gear wheels, firmly apply brakes before selecting gear up.

- 8. Fuel pumps LH/RH ..... OFF

**END OF CHECKLIST**

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**4A.6.8 CLIMB**

Initial Climb Check

1. Landing light ..... OFF / as required
2. Landing gear ..... check UP
3. FLAPS ..... check UP
  
4. Airspeed ..... 90 KIAS (best rate-of-climb)  
90 KIAS / as required for en route  
(cruise) climb
  
5. POWER lever ..... 92% or maximum 2100 RPM
6. Trim ..... as required (ball centered)
7. Annunciations / Engine / System Page ..... monitor

**CAUTION**

If the oil temperature and/or coolant temperature reaches the yellow range during climb, flight should be continued with the airspeed increased by 10 kts and power reduced by 10 % (reduced climb rate) for better engine cooling.

**NOTE**

Operating in the gearbox temperature cautionary range is permitted. However, prolonged operation is not recommended.

**END OF CHECKLIST**



GFC 700 Operation During Climb**NOTE**

The NOSE UP and NOSE DN buttons on the mode controller on the MFD are referenced to airplane movement. The NOSE UP button will increase the reference pitch attitude, increase the reference vertical speed and decrease the reference airspeed. Likewise, the NOSE DN button will decrease the reference pitch attitude, decrease the reference vertical speed, and increase the reference airspeed.

*a) Vertical Speed (VS)*

1. Altitude preselect . . . . . set to desired altitude
2. Mode controller . . . . . select VS on mode controller
3. Vertical speed reference . . . . . adjust using NOSE UP  
and NOSE DN buttons
4. White ALT (altitude preselect armed) . . . . . note on PFD
5. Green ALT . . . . . verify upon altitude capture

**NOTE**

If the altitude preselect is not changed before selecting VS, the autopilot may re-capture the current altitude immediately after entering VS mode. Always ensure that the altitude preselect is adjusted prior to selecting VS.

The vertical speed mode is limited to 1500 ft/min climb and 3000 ft/minute descent. Use engine power to maintain appropriate airplane speed. If the CWS switch is used while in VS mode, the VS reference will change to the vertical speed when the CWS switch is released.

**END OF CHECKLIST**

*b) Flight Level Change (FLC)*

1. Altitude preselect . . . . . set to desired altitude
2. Mode controller . . . . . select FLC on mode controller
3. Airspeed speed reference . . . . . adjust using NOSE UP  
and NOSE DN buttons
4. White ALT (altitude preselect armed) . . . . . note on PFD
5. Green ALT . . . . . verify upon altitude capture

**NOTE**

If the altitude preselect is not changed before selecting FLC, the autopilot may re-capture the current altitude immediately after entering FLC mode. Always ensure that the altitude preselect is adjusted prior to selecting FLC.

If the airspeed reference cannot be maintained without deviating away from the selected altitude, the system will maintain level flight until the power or reference is changed to allow climbing or descending towards the selected altitude.

The FLC mode is limited to airspeeds between 90 KIAS and 180 KIAS. Use engine power to maintain appropriate vertical speed. If the CWS switch is used while in FLC mode, the airspeed reference will change to the airspeed when the CWS switch is released.

**END OF CHECKLIST**

*c) To Capture a Selected Altitude*

- 1. Altimeter setting ..... adjust to appropriate value
- 2. Altitude preselect ..... set to desired altitude
- 3. Vertical mode and reference ..... select on mode controller
- 4. White ALT (altitude preselect armed) ..... note on PFD
- 5. Green ALT ..... verify upon altitude capture

**NOTE**

In ALT mode, the autopilot will maintain the reference altitude shown in the autopilot window of the PFD regardless of the altitude in the altitude preselect window or the altimeter's barometric pressure setting. If the altimeter setting is changed, the autopilot will climb or descend to maintain the reference altitude.

**END OF CHECKLIST**

*d) Navigation Capture and Track:*

1. Navigation source . . . . . select VOR or GPS using  
CDI button on PFD
2. Course bearing pointer . . . . . set using course knob  
(VOR only)
3. Intercept heading . . . . . establish in HDG or ROL mode  
(if required)
4. Mode controller . . . . . select NAV on mode controller
5. Green or white VOR or GPS annunciation . . note on PFD
6. Vertical mode and reference . . . . . select on mode controller

**NOTE**

If the Course Deviation Indicator (CDI) is greater than one dot from center, the autopilot will arm the NAV mode and indicate VOR or GPS in white on the PFD. The pilot must ensure that the current heading will result in a capture of the selected course. If the CDI is one dot or less from center, the autopilot will enter the capture mode when the NAV button is pressed and annunciate VOR or GPS in green on the PFD.

**END OF CHECKLIST**

**4A.6.9 CRUISE**

- 1. POWER lever ..... up to 92% or maximum  
2100 RPM

**NOTE**

The engine manufacturer recommends a cruise power setting of 75 %.

- 2. Trim ..... as required
- 3. Annunciations / Engine / System Page ..... monitor

Use of the Auxiliary Fuel Tanks (if installed)

**CAUTION**

When operating the AUX PUMP LH / RH switch, make sure not to exceed the fuel imbalance limitations given in Section 2.14.

To avoid additional imbalance in the auxiliary tanks both AUX PUMP switches must be operated simultaneously.

*1. Transfer the first half of the auxiliary fuel:*

As soon as the fuel quantity in each main fuel tank is 17 US gal or less, set both AUX PUMP switches to ON until the main tanks are full again.

Monitor the fuel quantity indicator to verify that fuel is properly transferred to both main fuel tanks (approx. 1 US gal per minute). If the fuel quantity in a main tank does not increase during fuel transfer, proceed according to Section 4B.12 - L/R FUEL TRANSFER FAIL.

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2. *Transfer the second half of the auxiliary fuel:*

Repeat the procedure described above.

**NOTE**

Transfer the fuel from the auxiliary tanks to the main tanks as soon as possible. The fuel in the auxiliary tanks must be transferred to the main tanks to become available for the current flight mission.

**END OF CHECKLIST**

GFC 700 Operation During Cruise

**NOTE**

The NOSE UP and NOSE DN buttons on the mode controller on the MFD are referenced to airplane movement. The NOSE UP button will increase the reference pitch attitude, increase the reference vertical speed and decrease the reference airspeed. Likewise, the NOSE DN button will decrease the reference pitch attitude, decrease the reference vertical speed, and increase the reference airspeed.

a) *Vertical Speed (VS)*

1. Altitude preselect . . . . . set to desired altitude
2. Mode controller . . . . . select VS on mode controller
3. Vertical speed reference . . . . . adjust using NOSE UP  
and NOSE DN buttons
4. White ALT (altitude preselect armed) . . . . . note on PFD
5. Green ALT . . . . . verify upon altitude capture

**CONTINUED**

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**NOTE**

If the altitude preselect is not changed before selecting VS, the autopilot may re-capture the current altitude immediately after entering VS mode. Always ensure that the altitude preselect is adjusted prior to selecting VS.

The vertical speed mode is limited to 1500 ft/min climb and 3000 ft/minute descent. Use engine power to maintain appropriate airplane speed. If the CWS switch is used while in VS mode, the VS reference will change to the vertical speed when the CWS switch is released.

**END OF CHECKLIST**

*b) Flight Level Change (FLC)*

- 1. Altitude preselect ..... set to desired altitude
- 2. Mode controller ..... select FLC on mode controller
- 3. Airspeed speed reference ..... adjust using NOSE UP  
and NOSE DN buttons
- 4. White ALT (altitude preselect armed) ..... note on PFD
- 5. Green ALT ..... verify upon altitude capture

**CONTINUED**

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**NOTE**

If the altitude preselect is not changed before selecting FLC, the autopilot may re-capture the current altitude immediately after entering FLC mode. Always ensure that the altitude preselect is adjusted prior to selecting FLC.

If the airspeed reference cannot be maintained without deviating away from the selected altitude, the system will maintain level flight until the power or reference is changed to allow climbing or descending towards the selected altitude.

The FLC mode is limited to airspeeds between 90 KIAS and 180 KIAS. Use engine power to maintain appropriate vertical speed. If the CWS switch is used while in FLC mode, the airspeed reference will change to the airspeed when the CWS switch is released.

**END OF CHECKLIST**

*c) To Capture a Selected Altitude*

1. Altimeter setting . . . . . adjust to appropriate value
2. Altitude preselect . . . . . set to desired altitude
3. Vertical mode and reference . . . . . select on mode controller
4. White ALT (altitude preselect armed) . . . . . note on PFD
5. Green ALT . . . . . verify upon altitude capture

**CONTINUED**

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**NOTE**

In ALT mode, the autopilot will maintain the reference altitude shown in the autopilot window of the PFD regardless of the altitude in the altitude preselect window or the altimeter's barometric pressure setting. If the altimeter setting is changed, the autopilot will climb or descend to maintain the reference altitude.

**END OF CHECKLIST**

*d) Altitude Hold*

To maintain a selected altitude:

1. Altimeter setting ..... adjust to appropriate value
2. Reaching desired altitude ..... select ALT on mode controller
3. Green ALT ..... verify on PFD

**END OF CHECKLIST**

*e) Navigation Capture and Track:*

1. Navigation source . . . . . select VOR or GPS using  
CDI button on PFD
2. Course bearing pointer . . . . . set using course knob  
(VOR only)
3. Intercept heading . . . . . establish in HDG or ROL  
mode (if required)
4. Mode controller . . . . . select NAV on mode controller
5. Green or white VOR or GPS annunciation . . note on PFD
6. Vertical mode and reference . . . . . select on mode controller

**NOTE**

If the Course Deviation Indicator (CDI) is greater than one dot from center, the autopilot will arm the NAV mode and indicate VOR or GPS in white on the PFD. The pilot must ensure that the current heading will result in a capture of the selected course. If the CDI is one dot or less from center, the autopilot will enter the capture mode when the NAV button is pressed and annunciate VOR or GPS in green on the PFD.

**END OF CHECKLIST**

**4A.6.10 DESCENT**

1. POWER lever ..... as required
2. Airspeed ..... as required
3. Trim ..... as required
4. Annunciations/Engine/System Page ..... monitor

**END OF CHECKLIST**GFC 700 Operation During Descent**NOTE**

The NOSE UP and NOSE DN buttons on the mode controller on the MFD are referenced to airplane movement. The NOSE UP button will increase the reference pitch attitude, increase the reference vertical speed and decrease the reference airspeed. Likewise, the NOSE DN button will decrease the reference pitch attitude, decrease the reference vertical speed, and increase the reference airspeed.

*a) Vertical Speed (VS)*

1. Altitude preselect ..... set to desired altitude
2. Mode controller ..... select VS on mode controller
3. Vertical speed reference ..... adjust using NOSE UP  
and NOSE DN buttons
4. White ALT (altitude preselect armed) ..... note on PFD
5. Green ALT ..... verify upon altitude capture

**CONTINUED**

**NOTE**

If the altitude preselect is not changed before selecting VS, the autopilot may re-capture the current altitude immediately after entering VS mode. Always ensure that the altitude preselect is adjusted prior to selecting VS.

The vertical speed mode is limited to 1500 ft/min climb and 3000 ft/minute descent. Use engine power to maintain appropriate airplane speed. If the CWS switch is used while in VS mode, the VS reference will change to the vertical speed when the CWS switch is released.

**END OF CHECKLIST**

*b) Flight Level Change (FLC)*

1. Altitude preselect . . . . . set to desired altitude
2. Mode controller . . . . . select FLC on mode controller
3. Airspeed speed reference . . . . . adjust using NOSE UP  
and NOSE DN buttons
4. White ALT (altitude preselect armed) . . . . . note on PFD
5. Green ALT . . . . . verify upon altitude capture

**CONTINUED**

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**NOTE**

If the altitude preselect is not changed before selecting FLC, the autopilot may re-capture the current altitude immediately after entering FLC mode. Always ensure that the altitude preselect is adjusted prior to selecting FLC.

If the airspeed reference cannot be maintained without deviating away from the selected altitude, the system will maintain level flight until the power or reference is changed to allow climbing or descending towards the selected altitude.

The FLC mode is limited to airspeeds between 90 KIAS and 180 KIAS. Use engine power to maintain appropriate vertical speed. If the CWS switch is used while in FLC mode, the airspeed reference will change to the airspeed when the CWS switch is released.

**END OF CHECKLIST**

*c) To Capture a Selected Altitude*

- 1. Altimeter setting ..... adjust to appropriate value
- 2. Altitude preselect ..... set to desired altitude
- 3. Vertical mode and reference ..... select on mode controller
- 4. White ALT (altitude preselect armed) ..... note on PFD
- 5. Green ALT ..... verify upon altitude capture

**CONTINUED**

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### NOTE

In ALT mode, the autopilot will maintain the reference altitude shown in the autopilot window of the PFD regardless of the altitude in the altitude preselect window or the altimeter's barometric pressure setting. If the altimeter setting is changed, the autopilot will climb or descend to maintain the reference altitude.

### END OF CHECKLIST

*d) Navigation Capture and Track:*

1. Navigation source ..... select VOR or GPS using  
CDI button on PFD
2. Course bearing pointer ..... set using course knob  
(VOR only)
3. Intercept heading ..... establish in HDG or ROL  
mode (if required)
4. Mode controller ..... select NAV on mode controller
5. Green or white VOR or GPS annunciation .. note on PFD
6. Vertical mode and reference ..... select on mode controller

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**NOTE**

If the Course Deviation Indicator (CDI) is greater than one dot from center, the autopilot will arm the NAV mode and indicate VOR or GPS in white on the PFD. The pilot must ensure that the current heading will result in a capture of the selected course. If the CDI is one dot or less from center, the autopilot will enter the capture mode when the NAV button is pressed and annunciate VOR or GPS in green on the PFD.

**END OF CHECKLIST**

**4A.6.11 APPROACH & LANDING**

*Approach:*

**CAUTION**

For landing the adjustable backrests (if installed) must be fixed in the upright position.

1. Adjustable backrests (if installed) . . . . . adjust to the upright position described by a placard on the roll-over bar and verify proper fixation

**NOTE**

If the landing mass exceeds 1805 kg (3979 lb), the landing constitutes an abnormal operating procedure. Refer to Section 4B.11.

2. Safety harnesses . . . . . check fastened and tightened
3. Yaw damper . . . . . check OFF
4. Controls . . . . . no interference by foreign objects
5. Landing light . . . . . as required
6. Gear warning horn . . . . . check function
7. FUEL SELECTOR . . . . . check ON
8. Fuel pumps LH/RH . . . . . ON

**CAUTION**

Switching on the fuel pump in combination with CROSSFEED may cause damage to the high-pressure pump.

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- 9. LANDING GEAR ..... DOWN, check 3 green
- 10. Parking brake ..... check released
- 11. Trim ..... as required, directional  
trim neutral

*Before landing:*

- 12. Airspeed ..... min. 86 KIAS with FLAPS UP  
min. 84 KIAS with FLAPS APP
- 13. FLAPS ..... as required
- 14. POWER lever ..... as required
- 15. Trim ..... as required, directional trim  
neutral
- 16. Final approach speed ..... min. 84 KIAS with FLAPS LDG

**NOTE**

Higher approach speeds result in a significantly longer landing distance during flare.

**CAUTION**

In conditions such as (e.g.) strong wind, danger of wind shear or turbulence a higher approach speed should be selected.

**END OF CHECKLIST**

GFC 700 Operation During Approach and Landing

a) VOR

1. Navigation source . . . . . select VOR using CDI  
button on PFD
2. Course bearing pointer . . . . . set using course knob
3. Intercept heading . . . . . establish in HDG or ROL  
mode (if required)
4. Mode controller . . . . . select APR on mode controller
5. Green or white VAPP annunciation . . . . . note on PFD
6. Vertical mode and reference . . . . . select on mode controller

**NOTE**

If the Course Deviation Indicator (CDI) is greater than one dot from center, the autopilot will arm the VAPP mode and indicate VAPP in white on the PFD. The pilot must ensure that the current heading will result in a capture of the selected course. If the CDI is one dot or less from center, the autopilot will enter the capture mode when the VAPP button is pressed and annunciate VAPP in green on the PFD.

**END OF CHECKLIST**

b) ILS

1. Navigation source . . . . . select LOC using CDI button on PFD
2. Course bearing pointer . . . . . set using course knob
3. Intercept heading . . . . . establish in HDG or ROL mode (if required)
4. Mode controller . . . . . select APR on mode controller
5. Green or white LOC and GS annunciation . . note on PFD
6. Vertical mode and reference . . . . . select on mode controller

**NOTE**

When the selected navigation source is a valid ILS, glideslope coupling is automatically armed when tracking the localizer. The glideslope cannot be captured until the localizer is captured. The autopilot can capture the glideslope from above or below the glideslope.

**END OF CHECKLIST**

c) *GPS*

1. Navigation source ..... select GPS using CDI  
button on PFD
2. Approach ..... load in FMS and ACTIVATE
3. Intercept heading ..... establish in HDG or ROL  
mode (if required)
4. Mode controller ..... select APR on mode controller
5. Green or white GPS annunciation ..... note on PFD
6. Vertical mode and reference ..... select on mode controller

**END OF CHECKLIST**

d) *Back Course (BC)*

1. Navigation source ..... select LOC using CDI  
button on PFD
2. Course bearing pointer ..... set to ILS front Course  
using course knob
3. Intercept heading ..... establish in HDG or ROL  
mode (if required)
4. Mode controller ..... select NAV on mode controller
5. Green or white BC annunciation ..... note on PFD

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**NOTE**

The course pointer must be at least 115° from the current magnetic heading before BC will be annunciated in the lateral mode field. Until that point, LOC will be annunciated.

Selecting NAV mode for back course approaches inhibits the glideslope from coupling.

- 6. Vertical mode and reference . . . . . select on mode controller

**END OF CHECKLIST**

**4A.6.12 GO AROUND**

1. POWER lever ..... MAX
2. Airspeed ..... min. 90 KIAS
3. FLAPS ..... position APP

*when a positive rate of climb is established:*

4. Landing gear ..... UP, check unsafe light off
5. FLAPS ..... retract, position UP

*when a safe climb is established:*

6. Fuel pumps LH/RH ..... OFF

**END OF CHECKLIST**

GFC 700 Operation During Go Around

1. Control stick ..... GRASP FIRMLY
2. GA button ..... PUSH - verify GA/GA on  
PFD in lateral and vertical mode  
fields

**NOTE**

After the GA button is pressed, the autopilot disconnects and the flight director indicates a 7° pitch up altitude.

3. Balked landing ..... execute
4. Missed approach procedure ..... execute (as applicable)
5. Altitude preselect ..... set to appropriate altitude

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*At an appropriate safe altitude:*

- 6. Autopilot mode controller ..... select appropriate lateral  
and vertical mode on controller
- 7. Autopilot ..... RE-ENGAGE if desired

**NOTE**

If the missed approach procedure requires tracking the localizer outbound from the airport, use NAV mode to prevent inadvertent coupling to glideslope.

**END OF CHECKLIST**

**4A.6.13 AFTER LANDING**

- 1. POWER lever ..... IDLE
- 2. Brakes ..... as required
- 3. Transponder ..... OFF / STBY
- 4. Pitot heating ..... OFF
- 5. Avionics ..... as required
- 6. Lights ..... as required
- 7. FLAPS ..... UP
- 8. Fuel pumps LH/RH ..... OFF

**END OF CHECKLIST**

**4A.6.14 SHUT-DOWN**

- 1. Parking brake ..... set
- 2. POWER lever ..... 10 % load for 1 minute
- 3. Engine/System Page ..... check
- 4. ELT ..... check not transmitting on  
121.5 MHz
- 5. AVIONIC MASTER ..... OFF
- 6. Electrical consumers ..... OFF
- 7. ENGINE MASTER ..... OFF
- 8. Anti collision lights (ACL) ..... OFF

**CAUTION**

After turning the ENGINE MASTER OFF, wait until the G1000 engine indications are red X'd prior to switching the ELECT. MASTER OFF. This ensures that engine and flight data can be written to non-volatile memory before removing electrical power.

- 9. ELECT. MASTER ..... OFF

**CAUTION**

Before shut-down the engine must run for at least 1 minute with the power lever at 10% to avoid heat damage of the turbo charger.

**CAUTION**

Do not shut down an engine with the FUEL SELECTOR valve. The high pressure fuel pump can otherwise be damaged.

**END OF CHECKLIST**

**4A.6.15 EXIT AIRPLANE**

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Exit the airplane to the aft on designated areas on the inner wing section LH or RH.

**4A.6.16 POST FLIGHT INSPECTION**

1. Record any problem found in flight and during the post-flight check in the log book.
2. Park the airplane.
3. If necessary, moor the airplane.

**END OF CHECKLIST**

**4A.6.17 PARKING**

1. Parking brake ..... release, use chocks
2. Airplane ..... moor, if unsupervised for  
extended period
3. Pitot probe ..... cover

**END OF CHECKLIST**

#### **4A.6.18 FLIGHT IN RAIN**

##### **NOTE**

Performance deteriorates in rain; this applies particularly to the take-off distance and to the maximum horizontal speed. The effect on the flight characteristics is minimal. Flight through very heavy rain should be avoided because of the associated visibility problems.

#### **4A.6.19 REFUELING**

##### **CAUTION**

Before refueling, the airplane must be connected to electrical ground. Grounding points: exhaust, left and right. Refer to Section 2.14 for approved fuel grades.

#### **Refueling of the Auxiliary Tanks (if installed)**

##### **CAUTION**

If the auxiliary tanks are used then both tanks must be refueled to the maximum level. Only then the pilot has proper information concerning the fuel quantity in the auxiliary tanks.

If the auxiliary tanks are not in use, make sure that they are empty (refer to Section 6.4).

#### **4A.6.20 FLIGHT AT HIGH ALTITUDE**

At high altitudes the provision of oxygen for the occupants is necessary. Legal requirements for the provision of oxygen should be adhered to.

Also see Section 2.11 - OPERATING ALTITUDE.

**4A.6.21 PRACTICE ONE ENGINE INOPERATIVE FLIGHT**

- Maximum altitude ..... 10,000 ft pressure altitude
- Minimum altitude ..... 5,000 ft above ground level
  
- Maximum restart airspeed ..... 100 KIAS or airspeed  
for a stationary propeller,  
whichever is lower

**CAUTION**

Do not attempt an in-flight engine restart if the engine has been shutdown for more than two minutes.

**CAUTION**

Do not engage the starter when the propeller is windmilling.

**NOTE**

At airspeeds below 100 KIAS it is possible that the propeller may windmill intermittently. Therefore, care should be taken to ensure that the propeller is stationary when engaging the starter.

**NOTE**

When demonstrating handling qualities with one engine inoperative the left engine is the critical engine.

- 1. Altitude ..... stabilize in level flight at an altitude within the altitude limits defined above
- 2. Airspeed ..... trim to 100 KIAS

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The following actions must be completed in not more than two minutes.

1. ENGINE MASTER of selected engine . . . . . OFF, propeller feathers
2. POWER lever of selected engine . . . . . IDLE
3. Airspeed . . . . . stabilize between 90 to 100 KIAS
4. ENGINE MASTER of selected engine . . . . . ON, propeller un-feathers
5. STARTER of selected engine . . . . . engage when propeller is  
stationary

**CAUTION**

After the engine has started, the POWER lever should be set to a moderate power setting until engine temperature have reached the green range.

**END OF CHECKLIST**

**4A.6.22 PRACTICE DEMONSTRATION OF  $V_{MCA}$**

The following procedure should be completed at an altitude of at least 5,000 feet above the ground.

1. Landing gear ..... UP
2. Flaps ..... UP
3. Airspeed ..... trim to 90 KIAS
4. POWER lever (simulated inoperative engine) IDLE
5. POWER lever (other engine) ..... MAX (take-off power)
6. Airspeed ..... reduce at approximately 1 knot per second until either  $V_{MCA}$  or stall warning is obtained

**NOTE**

Use rudder to maintain directional control (heading) and aileron to maintain up to 5° bank towards the operative engine. At the first sign of either  $V_{MCA}$  or stall warning initiate recovery: reduce power to IDLE on the operative engine and immediately lower the nose to regain the trim speed.

**END OF CHECKLIST**

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## CHAPTER 4B

# ABNORMAL OPERATING PROCEDURES

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**4B.1 PRECAUTIONARY LANDING**

**NOTE**

A landing of this type is only necessary when there is a reasonable suspicion that due to operational factors such as fuel shortage, weather conditions, etc. the possibility of endangering the airplane and its occupants by continuing the flight cannot be excluded. The pilot is required to decide whether or not a controlled landing in a field represents a lower risk than the attempt to reach the nearest airfield under all circumstances.

**NOTE**

If no level landing area is available, a landing on an upward slope should be sought.

1. Select appropriate landing area.
2. Consider wind.
3. Approach:

If possible, the landing area should be overflown at a suitable height in order to recognize obstacles. The degree of offset at each part of the circuit will allow the wind speed and direction to be assessed.

4. ATC ..... advise

Perform procedures according to Normal Procedures 4A.6.11 - APPROACH & LANDING.

5. Touchdown ..... with the lowest possible airspeed

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**CAUTION**

If sufficient time is remaining, the risk of fire in the event of a collision with obstacles can be reduced as follows after a safe touch-down:

6. ENGINE MASTER ..... both OFF
7. FUEL SELECTOR ..... both OFF
8. ELECT. MASTER ..... OFF

**END OF CHECKLIST**

**4B.2 CANOPY IN COOLING GAP POSITION****CAUTION**

If take-off was inadvertently done with the canopy in the cooling gap position, do not attempt to close the canopy in flight. Land the airplane and close the canopy on ground.

**4B.3 ENGINE INSTRUMENT INDICATIONS OUTSIDE OF GREEN RANGE ON THE G1000****4B.3.1 RPM**High RPM

1. Reduce power of affected engine.
2. Keep RPM within the green range using the power lever.

If the above mentioned measures do not solve the problem, refer to 3.11.3 - DEFECTIVE PROPELLER RPM REGULATING SYSTEM.

3. Land at the nearest suitable airfield.

**END OF CHECKLIST**

## **4B.3.2 COOLANT TEMPERATURE**

### **(a) High Coolant Temperature**

Proceed according to:

#### 3.2.2 - L/R ENG TEMP

### **(b) Low Coolant Temperature**

- Check G1000 for L/R COOL LVL caution message (low coolant level)

### **NOTE**

During an extended descent from high altitudes with a low power setting coolant temperature may decrease. In this case an increase in power and a decrease in airspeed can help.

*L/R COOL LVL caution message displayed:*

- Reduce power on affected engine.
- Expect loss of coolant.

### **WARNING**

A further decrease in coolant temperature must be expected. Prepare for an engine failure in accordance with 3.7.6 - ENGINE FAILURES IN FLIGHT.

**END OF CHECKLIST**

**4B.3.3 OIL TEMPERATURE****(a) High Oil Temperature**

Proceed according to:

3.2.3 - L/R OIL TEMP

**(b) Low Oil Temperature****NOTE**

During an extended descent from high altitudes with a low power setting oil temperature may decrease. In this case an increase in power can help.

- Increase power.
- Reduce airspeed.

**END OF CHECKLIST**

#### **4B.3.4 OIL PRESSURE**

##### **(a) High Oil Pressure**

- Check oil temperature.
- Check coolant temperature.

*if the temperatures are within the green range:*

- Expect false oil pressure indication. Keep monitoring temperatures.

*if the temperatures are outside of the green range:*

- Reduce power on affected engine.

#### **WARNING**

Land at the nearest suitable airfield. Prepare for an engine failure in accordance with 3.7.6 - ENGINE FAILURES IN FLIGHT.

#### **END OF CHECKLIST**

##### **(b) Low Oil Pressure**

Proceed according to:

3.2.4 - L/R OIL PRES

**4B.3.5 GEARBOX TEMPERATURE**High Gearbox Temperature

Proceed according to:

3.2.5 - L/R GBOX TEMP

**4B.3.6 FUEL TEMPERATURE**(a) High Fuel Temperature

Proceed according to:

3.2.6 - L/R FUEL TEMP

(b) Low Fuel Temperature

- Increase power on affected engine.
- Reduce airspeed.

**CAUTION**

At low ambient temperature conditions and/or at high airspeeds with low power settings, it can be assumed that the above mentioned procedure will increase the temperature(s). If the fuel temperature does not return to the green range perform a precautionary landing on the nearest suitable airfield. Prepare for an engine failure in accordance with 3.7.6 - ENGINE FAILURES IN FLIGHT.

**END OF CHECKLIST**

**4B.3.7 VOLTAGE**

(a) Low Voltage Indication on the Ground

1. Circuit breakers . . . . . check
2. POWER lever . . . . . increase RPM

*if LOW VOLTAGE CAUTION (LOW VOLTS / 4B.4.5) is still indicated on the G1000:*

- Terminate flight preparation.

(b) Low Voltage During Flight

1. Circuit breakers . . . . . check
2. Electrical equipment . . . . . OFF if not needed

*if LOW VOLTAGE CAUTION (LOW VOLTS / 4B.4.5) is still indicated on the G1000:*

- Follow procedure in 4B.4.6 - L/R ALTN FAIL.

**END OF CHECKLIST**



#### **4B.4 CAUTION-ALERTS ON THE G1000**

The G1000 provides the following CAUTION-alerts on the PFD in the ALERT area.

##### **4B.4.1 CAUTIONS / GENERAL**

<b>CHARACTERISTICS</b>	<ul style="list-style-type: none"><li>* amber color coded text</li><li>* Single warning chime tone of 1.5 seconds duration</li></ul>
------------------------	--

**4B.4.2 L/R ECU A FAIL**

<b>L/R ECU A FAIL</b>	* Left / Right engine ECU A has failed or * is being tested during ECU test procedure before take-off check.
-----------------------	--

(a) ECU A Caution on the Ground

- Terminate flight preparation.

(b) ECU A Caution During Flight

**NOTE**

In case of a failure in the electronic ECU (Engine Control Unit) A the system automatically switches to ECU B.

1. VOTER switch . . . . . switch to ECU B
2. Land on the nearest suitable airfield.
3. The engine must be serviced after landing.

**END OF CHECKLIST**

**4B.4.3 L/R ECU B FAIL**

<p><b>L/R ECU B FAIL</b></p>	<p>* Left / Right engine ECU B has failed or * is being tested during ECU test procedure before take-off check.</p>
------------------------------	---

(a) ECU B Caution on the Ground

- Terminate flight preparation.

(b) ECU B Caution During Flight

1. VOTER switch ..... switch to ECU A
2. Land on the nearest suitable airfield.
3. The engine must be serviced after landing.

**END OF CHECKLIST**

**4B.4.4 L/R FUEL LOW**

<b>L/R FUEL LOW</b>	Left / Right engine main tank fuel quantity is low.
---------------------	---

1. Fuel quantity ..... check

**CAUTION**

As soon as the amount of usable fuel in the main tank is low, a caution message is displayed. The indication is calibrated for straight and level flight. The caution message may be triggered during turns which are flown with slip, or while taxiing in curves.

*if fuel quantities of LH & RH engines show remarkable different fuel quantities in flight:*

- Expect loss of fuel on side with lower indication.
  - Use crossfeed function to ensure fuel supply.
2. Fuel pumps LH/RH ..... check OFF
  3. FUEL SELECTOR ..... CROSSFEED (engine with LOW FUEL indication)

**END OF CHECKLIST**

**4B.4.5 LOW VOLTAGE CAUTION (LOW VOLTS)**

<b>L/R VOLTS LOW</b>	Left / Right engine bus voltage is too low (less than 25 volts).
----------------------	--

*Possible reasons are:*

- A fault in the power supply.
- RPM too low.

Continue with 4B.3.7 - VOLTAGE.

**CAUTION**

If both low voltage indications are ON, expect failure of both alternators and follow 4B.4.6 - L/R ALTN FAIL.

**END OF CHECKLIST**

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**4B.4.6 L/R ALTN FAIL**

<b>L/R ALTN FAIL</b>	Left / Right engine alternator has failed.
----------------------	--

(a) One Alternator Failed

1. ALTERNATOR ..... OFF / affected side
2. Bus voltage ..... monitor
3. Electrical consumers ..... reduce as practicable

**END OF CHECKLIST**

(b) Both Alternators Failed

Proceed according to:

3.3.1 - L/R ALTN FAIL

**END OF CHECKLIST**

**4B.4.7 L/R COOL LVL**

<b>L/R COOL LVL</b>	Left / Right engine coolant level is low.
---------------------	---

A low coolant caution alert may indicate a loss of coolant. This will subsequently lead to decreased engine cooling capability / loss of engine power due to engine failure.

1. Annunciations / Engine instruments . . . . . monitor

See 4B.3.2 - COOLANT TEMPERATURE.

**NOTE**

The indication is calibrated for straight and level flight. The caution message may be triggered during turns which are flown with slip, or while taxiing in curves.

**END OF CHECKLIST**

**4B.4.8 PITOT FAIL / HT OFF**

<b>PITOT FAIL</b>	Pitot heating system has failed.
<b>PITOT HT OFF</b>	Pitot heating system is OFF.

1. PITOT HEAT ..... check ON / as required

**NOTE**

The Pitot heating caution message is displayed when the Pitot heating is switched OFF, or when there is a failure of the Pitot heating system. Prolonged operation of the Pitot heating on the ground can also cause the Pitot heating caution message to be displayed. In this case it indicates the activation of the thermal switch, which prevents overheating of the Pitot heating system on the ground. This is a normal function of the system. After a cooling period, the heating system will be switched on again automatically.

*If in icing conditions:*

2. Expect loss of static instruments.
3. Leave icing zone / refer to 3.11.4 - UNINTENTIONAL FLIGHT INTO ICING.

**END OF CHECKLIST**



**4B.4.9 STALL HT FAIL / OFF**

<b>STAL HT FAIL</b>	Stall warning heat has failed.
<b>STAL HT OFF</b>	Stall warning heat is OFF.

1. PITOT HEAT ..... check ON / as required

**NOTE**

The STAL HT OFF caution message is displayed when the Pitot heating is switched OFF, or STAL HT FAIL when there is a failure of the stall warning heating system. Operation of the stall warning heating on the ground also causes the stall warning heating failed caution message to be displayed. In this case it indicates the activation of the thermal protection relay, which prevents overheating of the stall warning heating system on the ground. This is a normal function of the system.

*If in icing conditions:*

2. Expect loss of acoustic stall warning.
3. Leave icing zone / refer to 3.11.4 - UNINTENTIONAL FLIGHT INTO ICING.

**END OF CHECKLIST**

**4B.4.10 L/R AUXILIARY FUEL TANK EMPTY (if installed)**

<b>L/R AUX FUEL E</b>	Left / Right auxiliary fuel tank empty (displayed only when AUX PUMP switch is ON).
-----------------------	---

The auxiliary tank empty caution message indicates an empty auxiliary fuel tank while the aux. fuel pump is switched ON.

1. L/R auxiliary fuel pump ..... OFF

**END OF CHECKLIST**

**4B.4.11 STICK LIMIT****STICK LIMIT**

Control stick limiting system (variable elevator stop) has failed.

The variable elevator backstop is activated depending on the position of the power levers. The system has two failure modes which can be identified as follows:

(a) Both power levers are in a position for a power setting of more than approximately 20 % LOAD:

**CAUTION**

The variable elevator backstop is inoperative. In case of stalling with "power-on" the handling qualities and stall-characteristics are degraded significantly. Do not stall the airplane in any configuration.

(b) At least one power lever is in a position for a power setting of less than approximately 20 % LOAD:

**CAUTION**

The variable elevator backstop is active all the time, reducing the maximum elevator "pull"-deflection. This results in reduced elevator capacity. In this case it is important not to reduce airspeed below required minimum  $v_{REF} = 84$  KIAS during the approach for landing, especially at loading conditions with forward locations of the center of gravity (see Section 4B.11).

**END OF CHECKLIST**

**4B.4.12 CHECK GEAR**

<b>CHECK GEAR</b>	Landing gear is not down and locked.
-------------------	--------------------------------------

1. Landing gear ..... down / as required

**NOTE**

The CHECK GEAR caution message is displayed when either the flaps are in LDG position or one power lever is less than approx 20% and the landing gear is not down and locked.

**END OF CHECKLIST**

**4B.4.13 RAIM UNAVAIL**

<b>INTEG</b>  <b>RAIM not available</b>	RAIM (Receiver Autonomous Integrity Monitor) is not available.
---	--

**(a) Enroute, Oceanic, Terminal, or Initial Approach Phase of Flight**

If the RAIM UNAVAIL annunciation is displayed in the enroute, oceanic, terminal, or initial approach phase of flight, continue to navigate using the GPS equipment or revert to an alternate means of navigation other than the G1000 GPS receiver appropriate to the route and phase of flight. When continuing to use GPS navigation, position must be verified every 15 minutes using the G1000 VOR / ILS receiver or another IFR-approved navigation system.

**(b) Final Approach**

If the RAIM UNAVAIL annunciation is displayed while on the final approach segment, GPS based navigation will continue for up to 5 minutes with approach CDI sensitivity (0.3 nautical miles). After 5 minutes the system will flag and no longer provide course guidance with approach sensitivity. Missed approach course guidance may still be available with 1 nautical mile CDI sensitivity and integrity by executing the missed approach.

**END OF CHECKLIST**

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**4B.4.14 AHRS ALIGNING - KEEP WINGS LEVEL**

<b>AHRS ALIGN: Keep Wings Level</b>	The AHRS (Attitude and Heading Reference System) is aligning.
---	---

Keep wings level using standby attitude indicator.

**END OF CHECKLIST**

**4B.5 FAILURES IN FLAP OPERATING SYSTEM**

Failure in Position Indication or Function

- 1. FLAPS position ..... check visually
- 2. Airspeed ..... keep in white sector  
(max. 113 KIAS)
- 3. FLAPS switch ..... re-check all positions

Modified Approach Procedure Depending on the Available Flap Setting

**NOTE**

Refer to 5.3.10 - LANDING DISTANCES for landing distances with abnormal flap positions.

(a) *Only UP available:*

Airspeed ..... min. 86 KIAS

Land at a flat approach angle, use power lever to control airplane speed and rate of descent.

(b) *Only APP available:*

Airspeed ..... min. 84 KIAS

Land at a flat approach angle, use power lever to control airplane speed and rate of descent.

(c) *Only LDG available:*

Perform normal landing.

**END OF CHECKLIST**

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**4B.6 FAILURES IN ELECTRICAL RUDDER PEDAL ADJUSTMENT**

Runaway of Electrical Rudder Pedal Adjustment (Optional Equipment, OÄM 42-070)

**NOTE**

The circuit breaker for the rudder pedal adjustment is located below the related switch, on the rear wall of the leg room.

1. Circuit breaker ..... pull

**END OF CHECKLIST**



## **4B.7 FAILURES IN HYDRAULIC SYSTEM**

### **4B.7.1 CONTINUOUS HYDRAULIC PUMP OPERATION**

1. Landing gear indication lights . . . . . check
2. Prepare for manual landing gear extension. Refer to Section 3.8.2 - MANUAL EXTENSION OF THE LANDING GEAR.

#### **NOTE**

The landing gear might extend as the hydraulic system pressure decreases. Consider for higher aerodynamic drag, resulting in degraded flight performance, increased fuel consumption and decreased range.

Unscheduled maintenance action is required after landing.

**END OF CHECKLIST**

**4B.7.2 HYDRAULIC PUMP FAILURE**

1. Landing gear indication lights . . . . . check
2. Prepare for manual landing gear extension. Refer to Section 3.8.2 - MANUAL EXTENSION OF THE LANDING GEAR.

**NOTE**

The landing gear might extend as the hydraulic system pressure decreases. Consider for higher aerodynamic drag, resulting in degraded flight performance, increased fuel consumption and decreased range.

Unscheduled maintenance action is required after landing.

**END OF CHECKLIST**

**4B.8 STARTING ENGINE WITH EXTERNAL POWER**

**4B.8.1 BEFORE STARTING ENGINE**

- 1. Pre-flight inspection ..... complete
- 2. Passengers ..... instructed

**NOTE**

Ensure all the passengers have been fully briefed on the use of the seat belts, adjustable back rests (if installed), doors and emergency exits and the ban on smoking.

- 3. Rear door ..... closed and locked
- 4. Front canopy ..... position 1 or 2 (“cooling gap”)
- 5. Rudder pedals ..... adjusted; if manual pedal adjustment is installed, verify proper locking
- 6. Safety harnesses ..... all on and fastened
- 7. POWER lever ..... check IDLE
- 8. Parking brake ..... set
- 9. AVIONIC MASTER ..... check OFF
- 10. GEAR selector ..... check DOWN
- 11. VOTER switch ..... check AUTO
- 12. ALTERNATORS ..... check ON
- 13. ELECT. MASTER ..... check OFF
- 14. ENGINE MASTER ..... check OFF
- 15. PROPELLER ..... check clear
- 16. External power ..... connect

**CONTINUED**

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**CAUTION**

When switching the External Power Unit ON, the electrically driven hydraulic gear pump may activate itself for 5 to 20 seconds in order to restore the system pressure. Should the pump continue to operate continuously or periodically, terminate flight. There is a malfunction in the landing gear system.

**NOTE**

When switching the External Power Unit ON, all electrical equipment, connected to the LH and RH main buses is powered.

17. G1000 ..... wait until power-up completed.  
Press ENT on MFD to  
acknowledge.

**NOTE**

The engine instruments are only available on the MFD after item 17 has been completed.

**END OF CHECKLIST**

**4B.8.2 STARTING ENGINE**

- 1. Strobe lights (ACL) . . . . . ON
- 2. Fuel pumps LH/RH . . . . . check OFF
- 3. ELECT. MASTER . . . . . ON
- 4. ENGINE MASTER . . . . . ON, LH side
- 5. Annunciations . . . . . check "L ENGINE GLOW" ON

**NOTE**

L ENGINE GLOW is indicated only when the engine is cold.

- 6. Annunciations / Engine / System Page . . . . . check OK / normal range

**WARNING**

Before starting the engine the pilot must ensure that the propeller area is free, and no persons can be endangered.

*After the L ENGINE GLOW indication is extinguished:*

- 7. START KEY . . . . . START L as required / release  
when engine has started

**CONTINUED**

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**CAUTION**

Do not overheat the starter motor. Do not operate the starter motor for more than 10 seconds.

At ambient temperatures below -20°C it is possible that the engine will not run at the first attempt. In this case wait 60 seconds between the start attempts.

If the L/R STARTER annunciation does not extinguish after the engine has started and the START KEY has been released, set the ENGINE MASTER to OFF and investigate the problem.

- 8. Annunciations / Engine / System Page . . . . . check OK / normal range
- 9. Annunciations / Starter . . . . . check OFF
- 10. Annunciations / Oil pressure . . . . . check OK

**WARNING**

If the oil pressure has not moved from the red range within 3 seconds after starting, set the ENGINE MASTER switch to OFF and investigate problem.

- 11. Circuit breakers . . . . . check all in / as required
- 12. Idle RPM . . . . . check, 740 ±30 RPM
- 13. External power . . . . . disconnect
- 14. RH engine . . . . . start with normal procedure
- 15. Warm up . . . . . IDLE for 30 seconds  
until oil temperature 50°C (122°F)  
and coolant temperature 60 °C  
(140°F) at 50% load and 1400 RPM

**END OF CHECKLIST**

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**4B.9 LIGHTNING STRIKE**

- 1. Airspeed ..... as low as practicable, do not exceed  $v_o$  (refer to Section 2.2)
- 2. Grasp airplane controls firmly
- 3. Autopilot ..... disengage (check)
- 4. PFD / backup instruments ..... verify periodically
- 5. Continue flight under VMC
- 6. Land on next suitable airfield

**CAUTION**

Due to possible damage to the airplane obey the following instructions:

- Avoid abrupt or full control surface movements.
- Avoid high g-loads on the airframe.
- Avoid high yaw angles.
- Avoid turbulent air as far as possible (e.g. lee effects).
- Do not fly into areas of known or forecast icing.
- Maintain VMC.

**END OF CHECKLIST**

## **4B.10 FAILURES IN THE AUTOPILOT SYSTEM**

### **4B.10.1 AUTOPILOT DISCONNECT (yellow AP flashing on PFD)**

1. AP DISC switch . . . . . DEPRESS AND RELEASE  
(to cancel disconnect tone)
2. Pitch trim . . . . . retrim if necessary, using  
the trim wheel

#### **NOTE**

The autopilot disconnect may be accompanied by a red boxed PTCH (pitch) or ROL on the PFD, indicating the axis which has failed. The autopilot cannot be re-engaged with either of these annunciations present.

**END OF CHECKLIST**



**4B.10.2 AUTOPILOT OVERSPEED RECOVERY (yellow MAXSPD on PFD)**

1. POWER lever ..... reduce power

*When overspeed condition is corrected:*

2. Autopilot ..... reselect VERTICAL MODE  
(if necessary)

**NOTE**

Overspeed recovery mode provides a pitch up command to decelerate the airplane at or below the maximum autopilot operating speed (180 KIAS). Overspeed recovery is not active in altitude hold (ALT) or glideslope (GS) modes.

**END OF CHECKLIST**

**4B.10.3 LOSS OF NAVIGATION INFORMATION (Yellow VOR, VAPP, GPS or LOC flashing on PFD)**

**NOTE**

If a navigation signal is lost while the autopilot is tracking it, the autopilot will roll the airplane wings level and default to roll mode (ROL).

1. Autopilot ..... select HDG on mode controller
2. Nav source ..... select a valid NAV source
3. Autopilot ..... select NAV on mode controller

*If on an instrument approach at the time the navigation signal is lost:*

4. Missed approach procedure ..... EXECUTE (as applicable)

**END OF CHECKLIST**

**4B.10.4 AUTOPILOT OUT OF TRIM (Yellow ←AIL, →AIL, ↑ELE, ↓ELE, ←RUD or →RUD on PFD)**

For ↑ELE, or ↓ELE Indication:

**WARNING**

Do not attempt to overpower the autopilot in the event of a pitch mistrim. The autopilot servos will oppose pilot input and will cause pitch trim to run opposite the direction of pilot input. This will lead to a significant out-of-trim condition resulting in large control stick force when disengaging the autopilot.

**CAUTION**

Be prepared for significant sustained control forces in the direction of the annunciation arrow. For example, an arrow pointing down indicates nose down control stick force will be required upon autopilot disconnect.

**NOTE**

Momentary illumination (5 sec or less) of the ↑ELE or ↓ELE indication during configuration or large airspeed changes is normal.

*If the annunciation remains:*

- 1. AP DISC switch ..... DEPRESS AND HOLD  
while grasping control stick firmly

**CONTINUED**

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- 2. Aircraft attitude ..... maintain / regain  
airplane control,  
use standby attitude indicator if  
necessary
- 3. Pitch trim ..... retrim if necessary, using  
the trim wheel
- 4. AUTOPILOT circuit breaker ..... PULL
- 5. AP DISC switch ..... RELEASE

**WARNING**

Following an autopilot, autotrim or manual electric trim system malfunction, do not engage the autopilot or operate the manual electric trim until the cause of the malfunction has been corrected.

**END OF CHECKLIST**

For →AIL, ←AIL or →RUD, ←RUD Indication:

- 1. Rudder trim ..... VERIFY slip / skid indicator is  
centered, trim is necessary

**NOTE**

Observe the maximum fuel imbalance limitation.

**END OF CHECKLIST**

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*If annunciation remains:*

- 2. Control stick ..... GRASP FIRMLY with both hands

**CAUTION**

Be prepared for sustained control forces in the direction of the annunciation arrow. For example, an →AIL indicates that sustained right wing down control stick force or for →RUD sustained right rudder force will be required upon autopilot disconnect.

- 3. AP DISC switch ..... DEPRESS
- 4. Autopilot ..... RE-ENGAGE if lateral trim is re-established

**END OF CHECKLIST**

**4B.10.5 FLASHING YELLOW MODE ANNUNCIATION**

**NOTE**

Abnormal mode transitions (those not initiated by the pilot or by normal sequencing of the autopilot) will be annunciated by flashing the disengaged mode in yellow on the PFD. Upon loss of a selected mode, the system will revert to the default mode for the affected axis, either ROL or PIT. After 10 seconds, the new mode (PIT or ROL) will be annunciated in green.

Loss of Selected Vertical Mode (FLC, VS, ALT, GS)

1. Autopilot mode controls . . . . . select another vertical mode

*If on an instrument approach:*

2. Autopilot . . . . . DISCONNECT and continue manually or execute missed approach

Loss of Selected Lateral Mode (HDG, NAV, GPS, LOC, VAPP, BC):

1. Autopilot mode controls . . . . . select another lateral mode

*If on an instrument approach:*

2. Autopilot . . . . . DISCONNECT and continue manually or execute missed approach

**END OF CHECKLIST**

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**4B.10.6 EFFECTS OF G1000 LOSSES UPON AUTOPILOT OPERATION**

G 1000 System Loss	Effect upon Autopilot Operation
AHRS	The autopilot disconnects and autopilot, yaw damper and flight director are inoperative. Manual electric trim is available.
HDG function of AHRS	The autopilot will remain engaged with the loss of the HDG Mode.
MFD	The autopilot will remain engaged with limited functionality.
PFD	The autopilot disconnects and autopilot and flight director are inoperative. Manual electric trim is available.
GIA No. 1	The autopilot disconnects and autopilot, flight director and manual electric trim are inoperative.
GIA No. 2	The autopilot disconnects and autopilot and manual electric trim are inoperative. Flight director is available.
GPS No. 1 and 2	The autopilot and flight director operates in NAV modes only (LOC, BC, VOR, VAPP) with reduced accuracy.
ADC	The autopilot disconnects and autopilot is inoperative. The flight director is available except for air data modes (ALT, VS, FLC). Manual electric trim is available.

## **4B.11 LANDING WITH HIGH LANDING MASS**

### **CAUTION**

Damage of the landing gear can result from a hard landing with a flight mass above the maximum landing mass.

### **NOTE**

A landing with a mass between 1805 kg (3979 lb) and 1900 kg (4189 lb) is admissible. It constitutes an abnormal operating procedure. A "Hard Landing Check" is only required after a hard landing, regardless of the actual landing mass.

Perform landing approach according to Section 4A.6.11.

**END OF CHECKLIST**



**4B.12 L/R AUX FUEL TRANSFER FAIL (IF AUX. TANKS ARE  
INSTALLED)**

*If the fuel quantity in a main tank does not increase during fuel transfer:*

1. Switch OFF both AUX PUMPS.
2. Check fuel pump LH/RH OFF.

**CAUTION**

An imbalance in the auxiliary tanks is approved when the imbalance in the main tanks is less than 1 US gal (3.8 liters).

2. Check fuel imbalance in the main tanks; use CROSSFEED function to keep the LH and RH main tank imbalance within the permissible limit of 1 US gal (3.8 liters).
3. Switch the remaining AUX PUMP ON.
4. Use crossfeed function to keep the LH and RH main tank imbalance within the permissible limit of 1 US gal (3.8 liters).

**END OF CHECKLIST**

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## CHAPTER 5

# PERFORMANCE

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## **5.1 INTRODUCTION**

The performance tables and diagrams on the following pages are presented so that, on the one hand, you can see what performance you can expect from your airplane, while on the other hand they allow comprehensive and sufficiently accurate flight planning. The values in the tables and the diagrams were obtained in the framework of the flight trials using an airplane and power-plant in good condition, and corrected to the conditions of the International Standard Atmosphere (ISA = 15 °C / 59 °F and 1013.25 hPa / 29.92 inHg at sea level).

The performance diagrams do not take into account variations in pilot experience or a poorly maintained airplane. The performances given can be attained if the procedures quoted in this manual are applied, and the airplane has been well maintained.

## **5.2 USE OF THE PERFORMANCE TABLES AND DIAGRAMS**

In order to illustrate the influence of a number of different variables, the performance data is reproduced in the form of tables or diagrams. These contain sufficiently detailed information so that conservative values can be selected and used for the determination of adequate performance data for the planned flight.

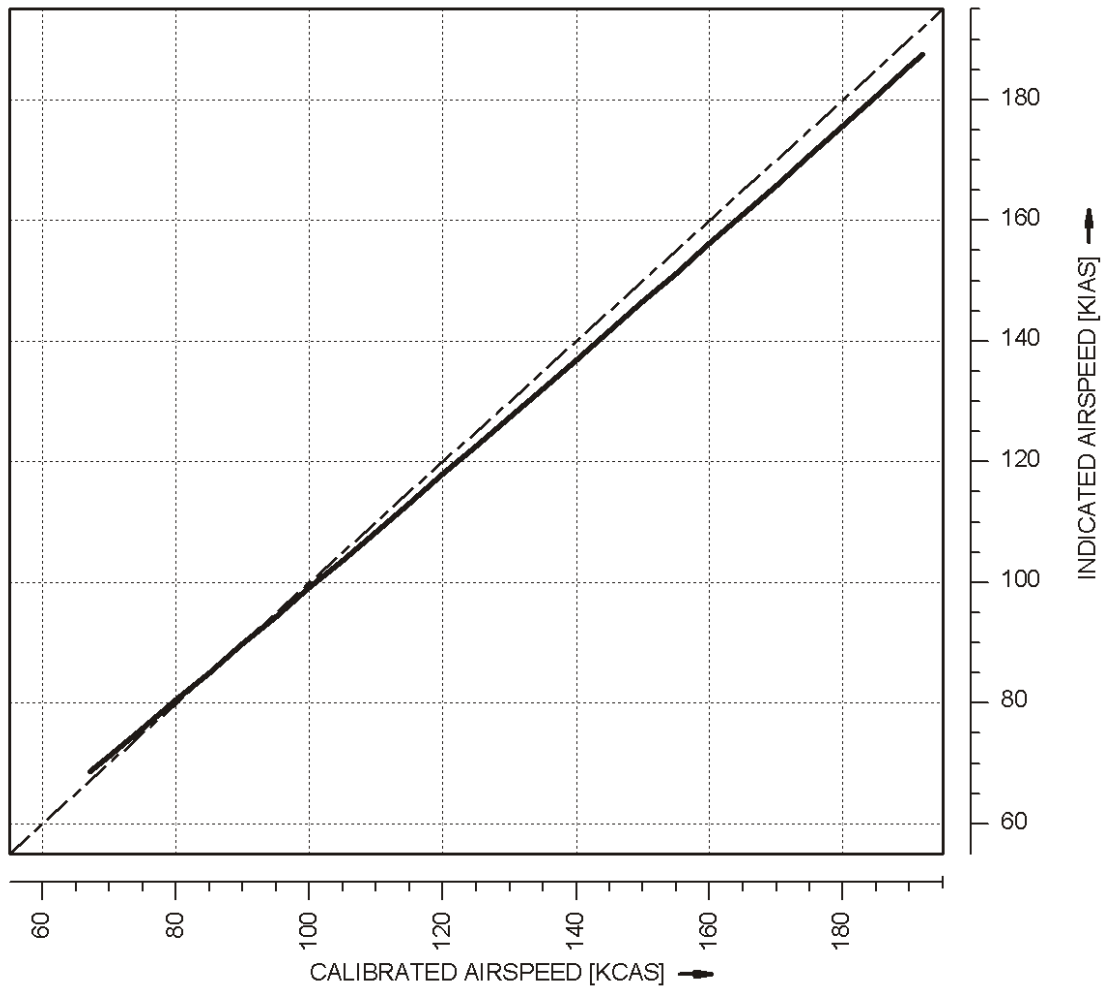
### 5.3 PERFORMANCE TABLES AND DIAGRAMS

#### 5.3.1 AIRSPEED CALIBRATION

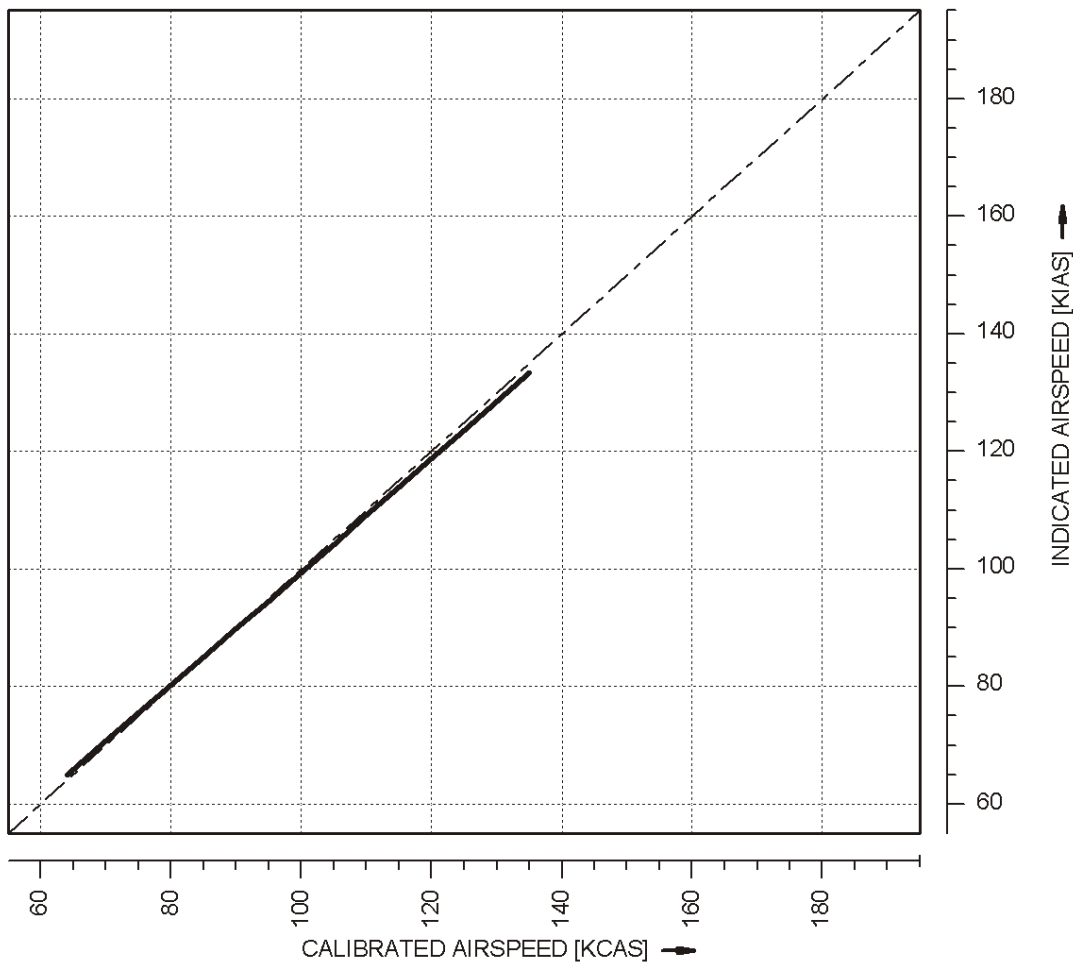
#### NOTE

The position of the landing gear (extended/retracted) has no significant influence on the airspeed indicator system.

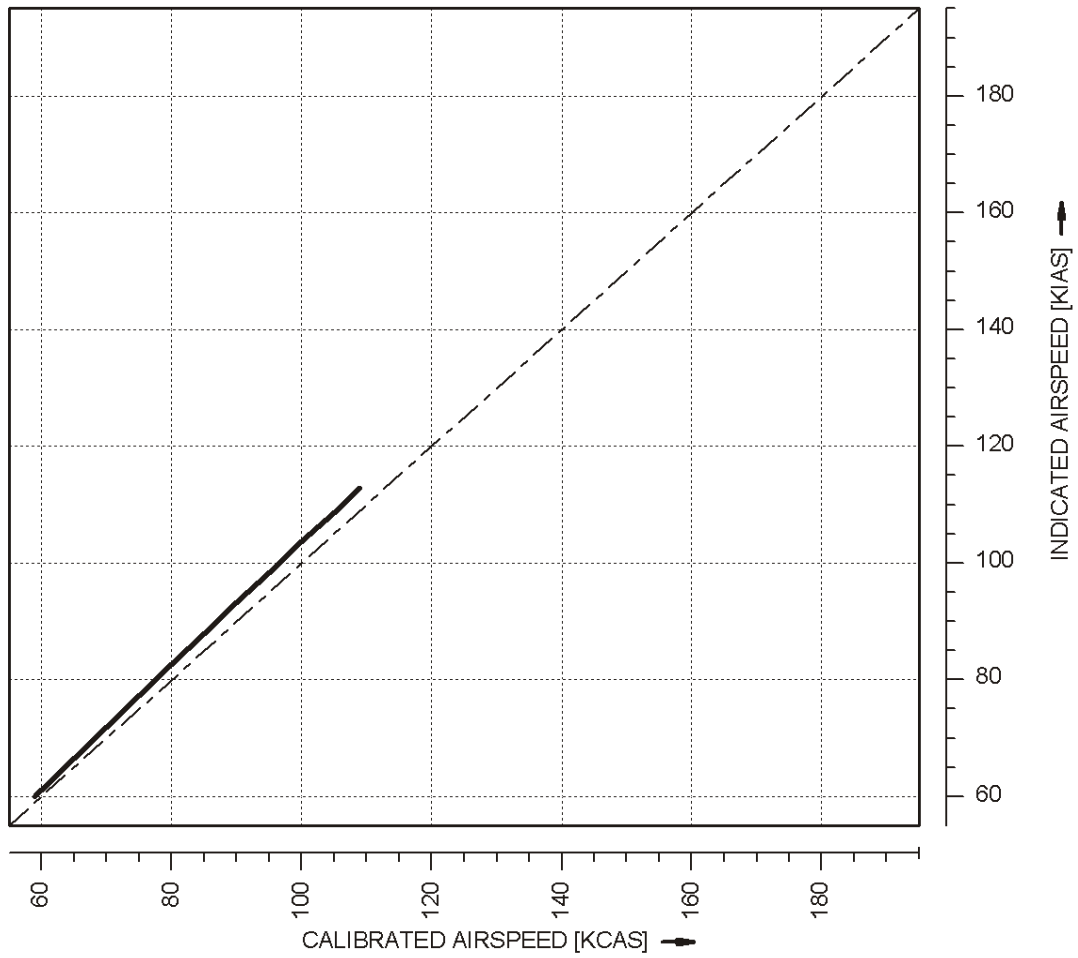
AIRSPEED INDICATOR SYSTEM  
FLAPS UP



AIRSPEED INDICATOR SYSTEM  
FLAPS APP



AIRSPEED INDICATOR SYSTEM  
FLAPS LDG



**5.3.2 FUEL FLOW DIAGRAM**

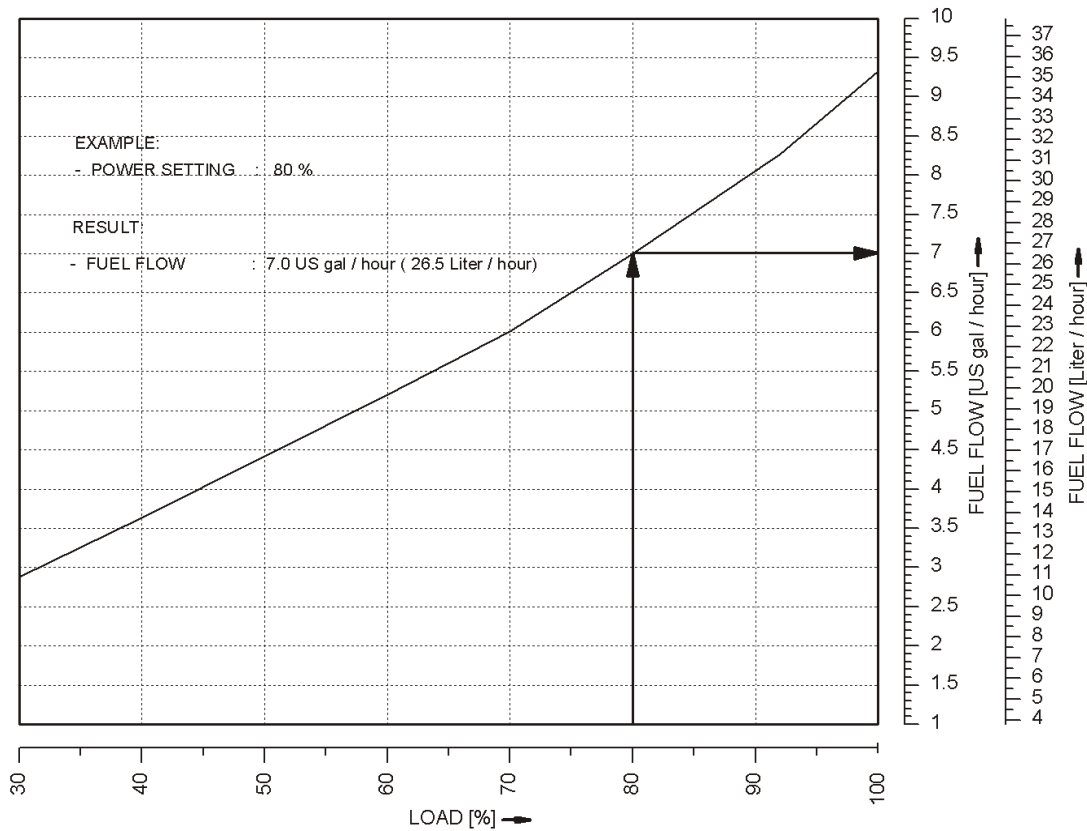
**CAUTION**

The diagram shows the fuel flow per hour for one engine.

**NOTE**

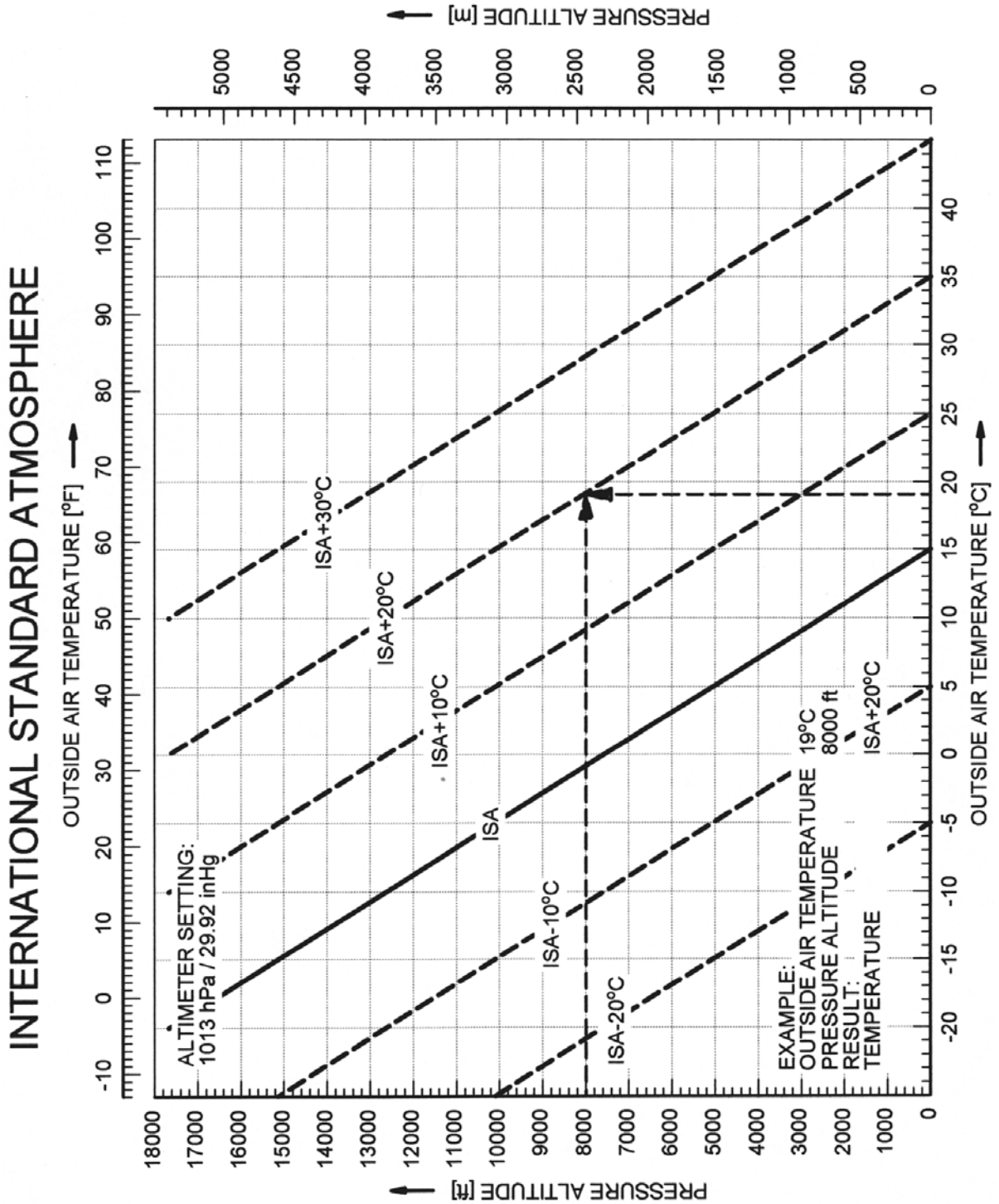
The fuel calculations on the FUEL CALC portion of the G1000 MFD do not use the airplane's fuel quantity indicators. The values shown are numbers which are calculated from the last fuel quantity update done by the pilot and actual fuel flow data. Therefore, the endurance and range data is for information only, and must not be used for flight planning.

DA 42 NG - FUEL FLOW





5.3.3 INTERNATIONAL STANDARD ATMOSPHERE



### 5.3.4 STALLING SPEEDS

#### Stalling Speeds at Various Flight Masses

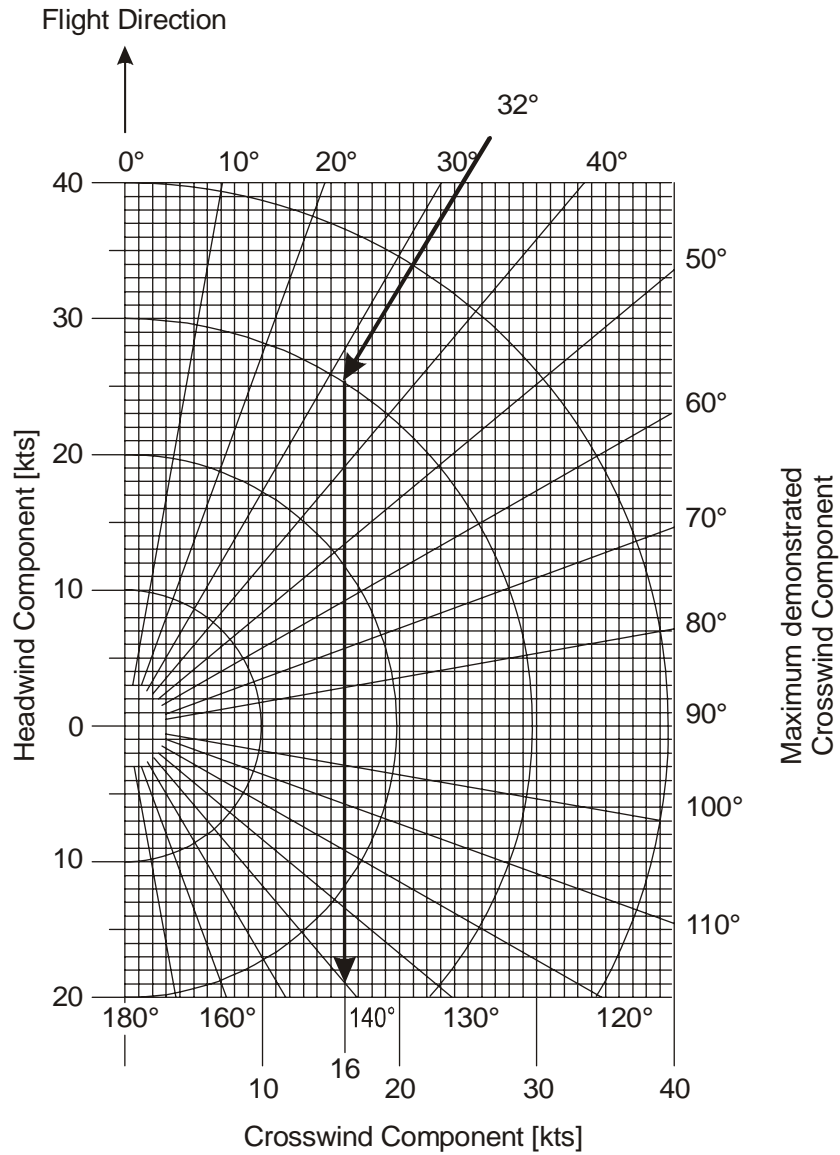
Airspeeds in KIAS at idle power:

1510 kg (3329 lb)		Bank Angle			
Gear	Flaps	0°	30°	45°	60°
UP	UP	62	66	73	85
DOWN	APP	62	67	73	86
DOWN	LDG	58	63	70	83

1700 kg (3748 lb)		Bank Angle			
Gear	Flaps	0°	30°	45°	60°
UP	UP	66	70	77	90
DOWN	APP	64	69	75	89
DOWN	LDG	60	65	72	86

1900 kg (4189 lb)		Bank Angle			
Gear	Flaps	0°	30°	45°	60°
UP	UP	69	74	81	95
DOWN	APP	66	71	78	92
DOWN	LDG	62	67	75	89

**5.3.5 WIND COMPONENTS**



Example: Flight direction : 360°  
 Wind : 32°/30 kts  
 Result: Crosswind component : 16 kts  
 Max. demonstrated crosswind component : 25 kts

**5.3.6 TAKE-OFF DISTANCE**

Conditions:

- Power lever ..... both MAX @ 2300 RPM
- Flaps ..... UP
- Nose wheel lift-off ..... @  $v_R = 80$  KIAS
- Airspeed for initial climb ..... 85 KIAS
- Runway ..... level, hard paved surface  
(concrete, asphalt, etc.)

values for ISA and MSL, at 1900 kg (4189 lb)	
Take-off distance to 50 ft (15 m) above take-off surface	733 m (2405 ft)
Take-off ground roll	458 m (1503 ft)

**NOTE**

The rate of climb with a power setting of 100% is 1180 ft/min (6.0 m/s) at MSL and ISA standard conditions.

**WARNING**

For a safe take-off the available runway length must be at least equal to the take-off distance over a 50 ft (15 m) obstacle.

**WARNING**

Poor maintenance condition of the airplane, deviation from the given procedures, uneven runway, as well as unfavorable external factors ( rain, unfavorable wind conditions, including cross-wind) will increase the take-off distance.

**CAUTION**

The figures in the following NOTE are typical values. On wet ground or wet soft grass covered runways the take-off roll may become significantly longer than stated below. In any case the pilot must allow for the condition of the runway to ensure a safe take-off.

**NOTE**

For take-off from dry, short-cut grass covered runways, the following corrections must be taken into account, compared to paved runways (typical values, see CAUTION above):

- grass up to 5 cm (2 in) long:10 % increase in take-off roll.
- grass 5 to 10 cm (2 to 4 in) long:15 % increase in take-off roll.
- grass longer than 10 cm (4 in): at least 25 % increase in take-off roll.
- on grass longer than 25 cm (10 in), a take-off should not be attempted.

**NOTE**

For wet grass, an additional 10 % increase in take-off roll must be expected.

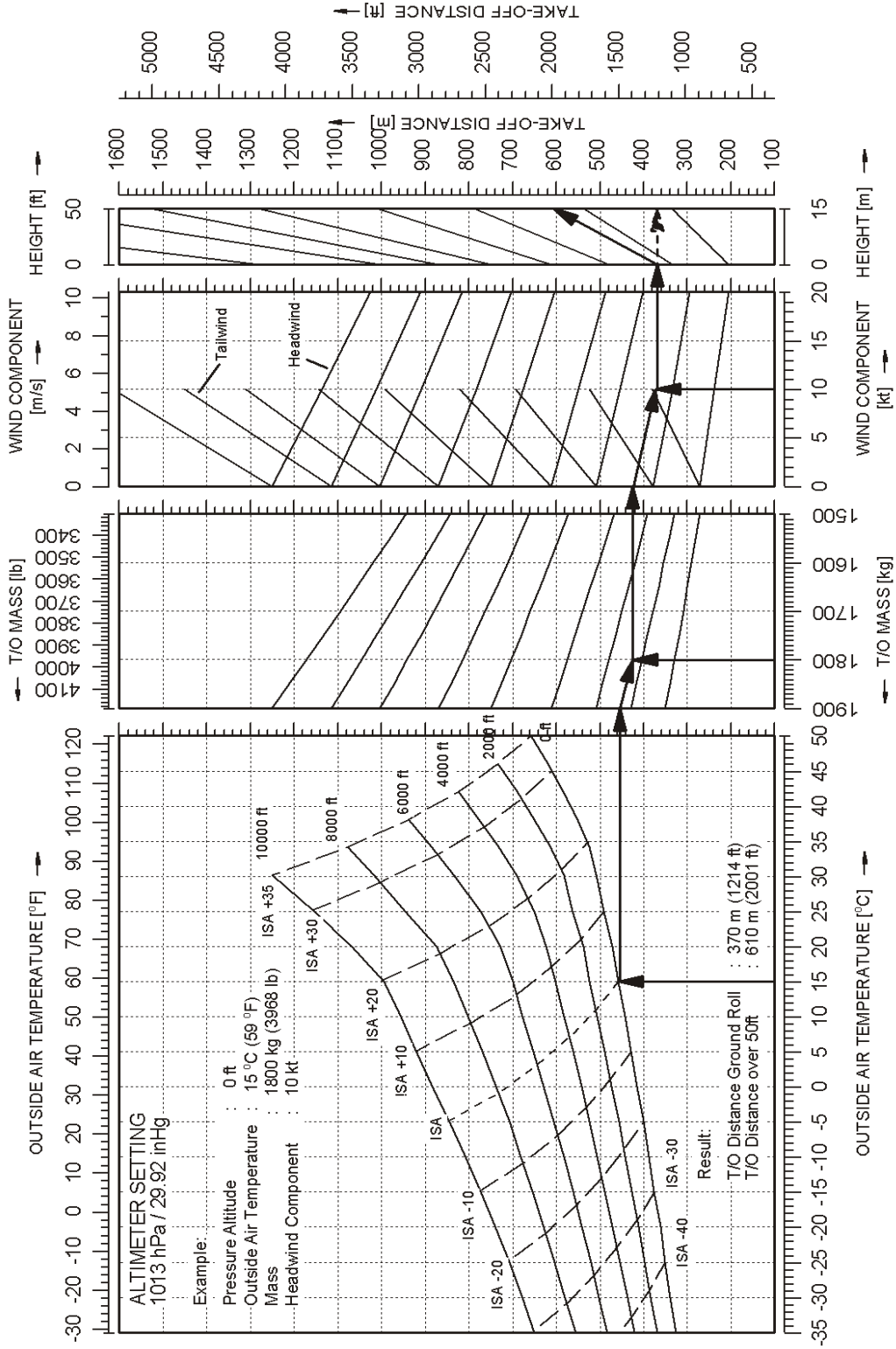
**NOTE**

For soft ground, an additional 45 % increase in take-off roll must be expected.

**NOTE**

An uphill slope of 2 % (2 m per 100 m or 2 ft per 100 ft) results in an increase in the take-off distance of approximately 10 %. The effect on the take-off roll can be greater.

# DA 42 NG - TAKE-OFF DISTANCES



Conditions: Flaps: UP, Power: both MAX @ 2300 RPM,  $v_R$ : 80 KIAS, Airspeed: 85 KIAS, Runway: hard, paved

### 5.3.7 CLIMB PERFORMANCE

Conditions:

- Power lever ..... both 92% load @ 2100 RPM
- Flaps ..... UP
- Landing gear ..... retracted
- Airspeed ..... 90 KIAS

#### **NOTE**

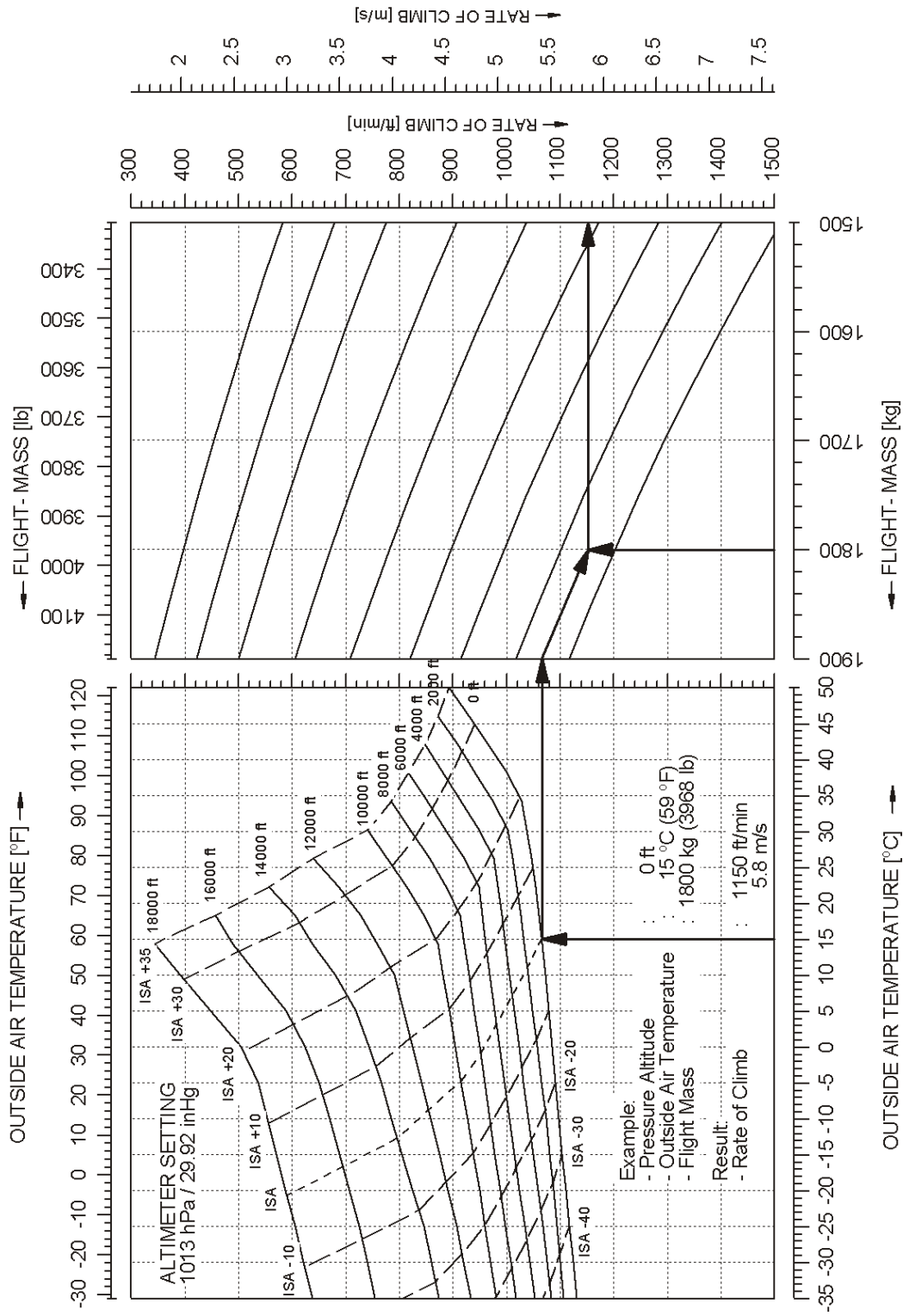
The charts on the following pages show the *rate* of climb. The *gradient* of climb cannot easily be determined with a chart, but it can be calculated using the following formulae:

$$\text{Gradient [\%]} = \frac{\text{ROC [fpm]}}{\text{TAS [KTAS]}} \cdot 0.95$$

$$\text{Gradient [\%]} = \frac{\text{ROC [m/s]}}{\text{TAS [KTAS]}} \cdot 190$$



# DA 42 NG - CLIMB PERFORMANCE - TWO ENGINES



Conditions: Flaps: UP, Power: both @ 92%, Landing gear: retracted, Airspeed: 90 KIAS

### 5.3.8 ONE ENGINE INOPERATIVE CLIMB PERFORMANCE

Conditions:

- Remaining engine (RH) ..... 92% load or maximum 2100 RPM
- Dead engine ..... feathered and secured
- Flaps ..... UP
- Airspeed ..... 85 KIAS
- Landing gear ..... retracted
- Zero sideslip ..... established

#### **NOTE**

With respect to handling and performance, the left-hand engine (pilots view) is considered the "critical" engine.

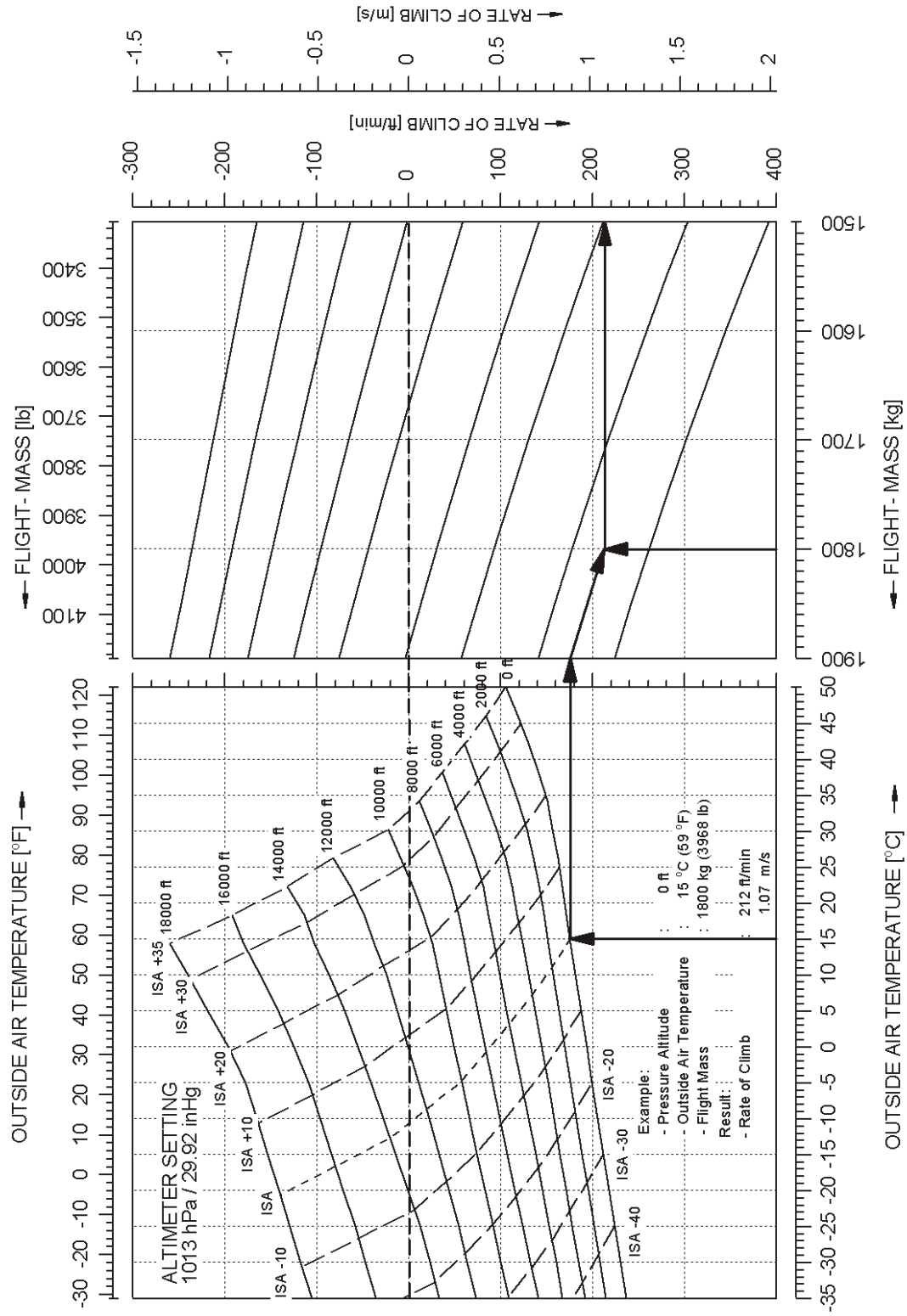
#### **NOTE**

The charts on the following pages show the *rate* of climb. The *gradient* of climb cannot easily be determined with a chart, but it can be calculated using the following formulae:

$$\text{Gradient [\%]} = \frac{\text{ROC [fpm]}}{\text{TAS [KTAS]}} \cdot 0.95$$

$$\text{Gradient [\%]} = \frac{\text{ROC [m/s]}}{\text{TAS [KTAS]}} \cdot 190$$

DA 42 NG - ONE ENGINE INOPERATIVE CLIMB / DESCENT



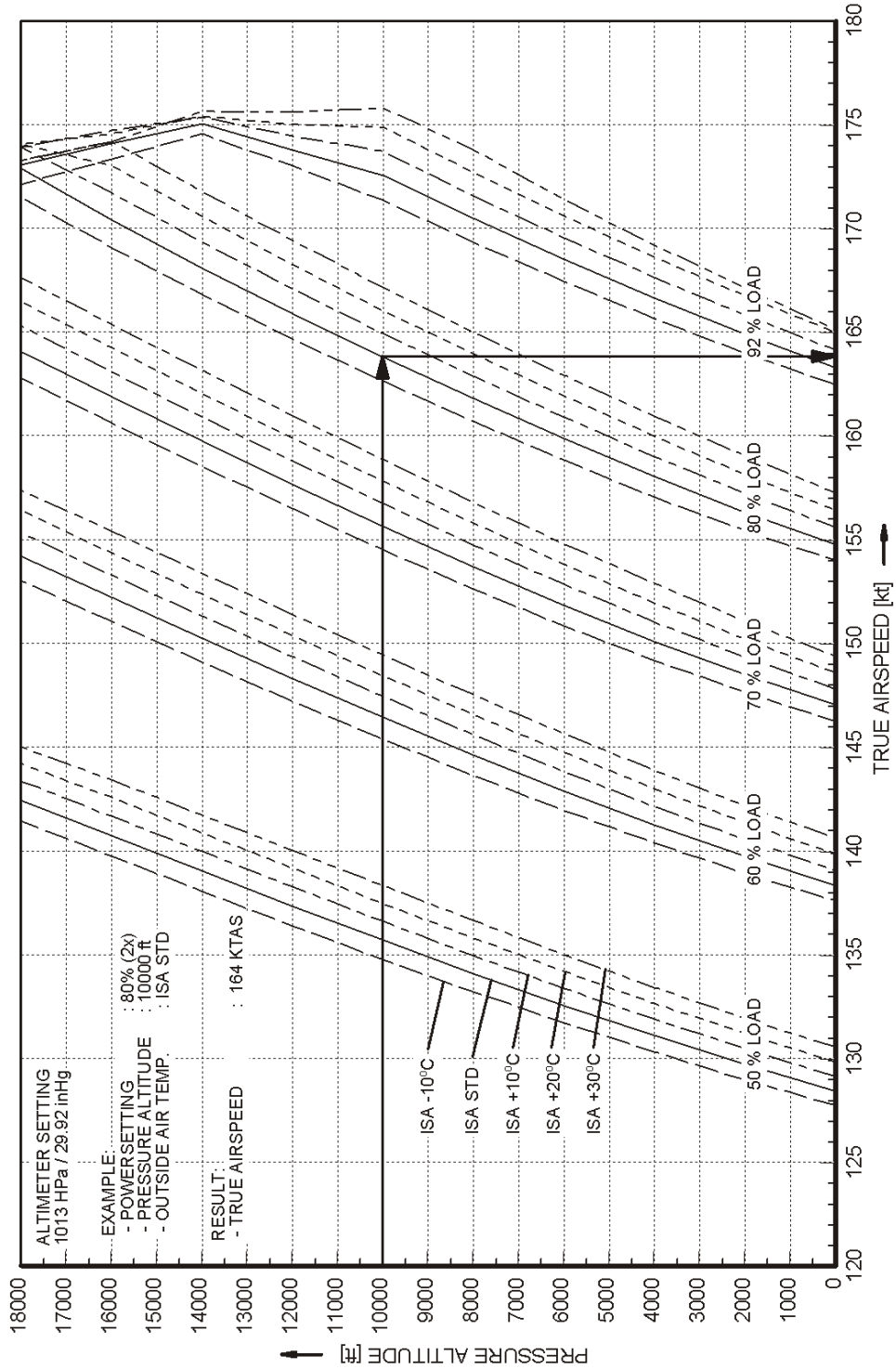
Conditions: Flaps: UP, Power: remaining engine @ 92% / dead engine: feathered and secured, Airspeed: 85 KIAS

**5.3.9 CRUISING (TRUE AIRSPEED TAS)**

Conditions:

- Engines ..... all operating
- Power lever ..... as required to adjust selected  
displayed LOAD [%]
- Flaps ..... UP
- Landing gear ..... retracted

DA 42 NG - CRUISING (TRUE AIRSPEED / TAS)



Conditions: Engines: both operating, Power: as required to adjust selected LOAD [%], Flaps: UP, Landing gear: retracted

**5.3.10 LANDING DISTANCES**

- Conditions:
- Power lever ..... both IDLE
  - Flaps ..... LDG
  - Runway ..... level, asphalt surface, dry

<b>Values for ISA and MSL, at 1805 kg (3979 lb), approach speed 84 KIAS</b>	
---	--

Landing distance from 50 ft (15 m) above the landing surface	598 m (1962 ft)
Ground roll	353 m (1158 ft)

**NOTE**

A landing with a mass between 1805 kg (3979 lb) and 1900 kg (4189 lb) is admissible. It constitutes an abnormal operating procedure.

<b>Values for ISA and MSL, at 1900 kg (4189 lb), approach speed 84 KIAS</b>	
---	--

Landing distance from 50 ft (15 m) above the landing surface	618 m (2028 ft)
Ground roll	369 m (1211 ft)

**WARNING**

For a safe landing the available runway length must be at least equal to the landing distance over a 50 ft (15 m) obstacle.

**WARNING**

Poor maintenance condition of the airplane, deviation from the given procedures, uneven runway, as well as unfavorable external factors (rain, unfavorable wind conditions, including cross-wind) will increase the landing distance.

**CAUTION**

The figures in the following NOTE are typical values. On wet ground or wet soft grass covered runways the landing distance may become significantly longer than stated below. In any case the pilot must allow for the condition of the runway to ensure a safe landing.

**NOTE**

For landings on dry, short-cut grass covered runways, the following corrections must be taken into account, compared to paved runways (typical values, see CAUTION above):

- grass up to 5 cm (2 in) long: 10 % increase in landing roll.
- grass 5 to 10 cm (2 to 4 in) long: 15 % increase in landing roll.
- grass longer than 10 cm (4 in): at least 25 % increase in landing roll.

**NOTE**

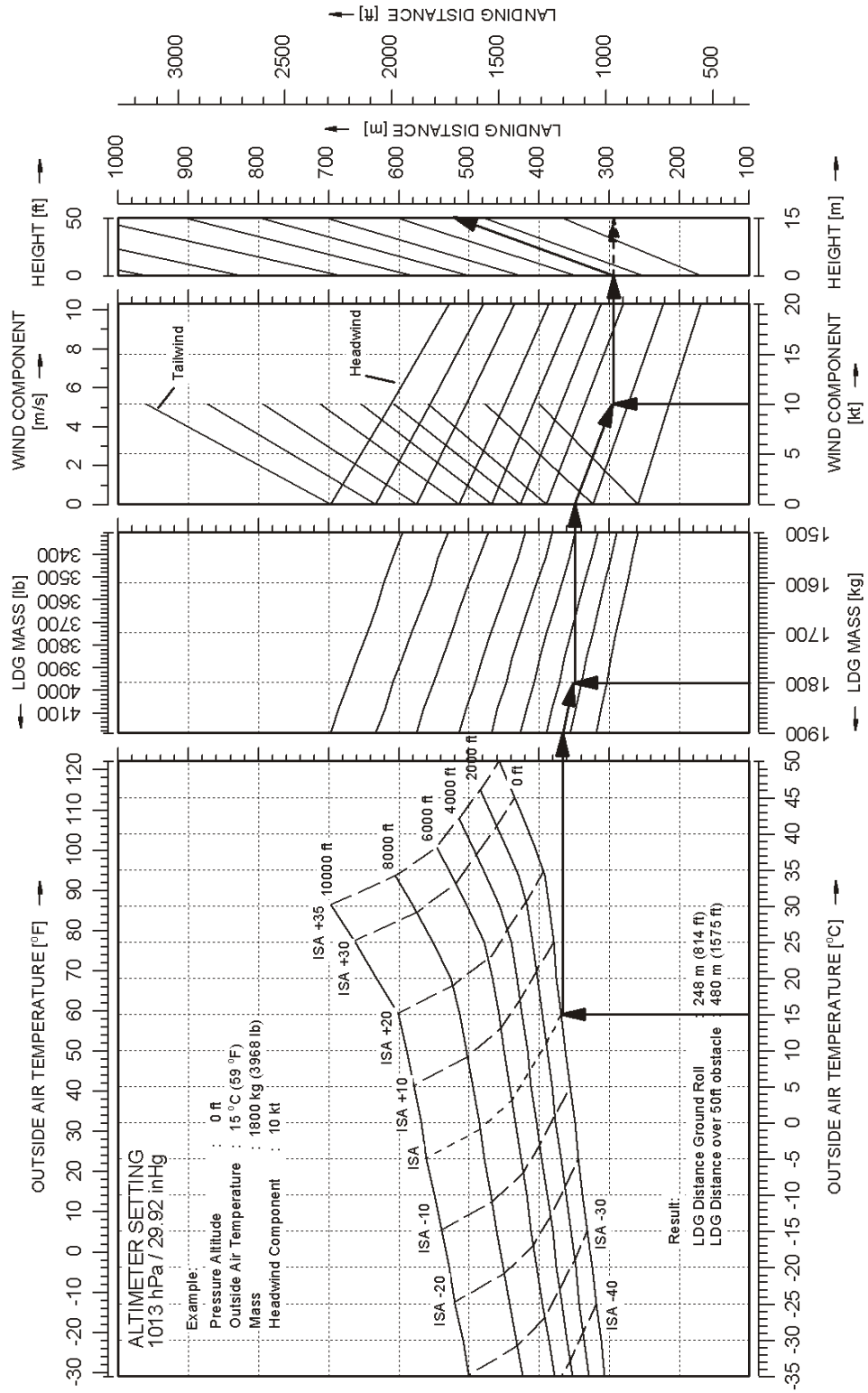
For wet grass or soft ground, an additional 10% increase in landing roll must be expected.

**NOTE**

A downhill slope of 2 % (2 m per 100 m or 2 ft per 100 ft) results in an increase in the landing distance of approximately 10 %. The effect on the landing roll can be greater.

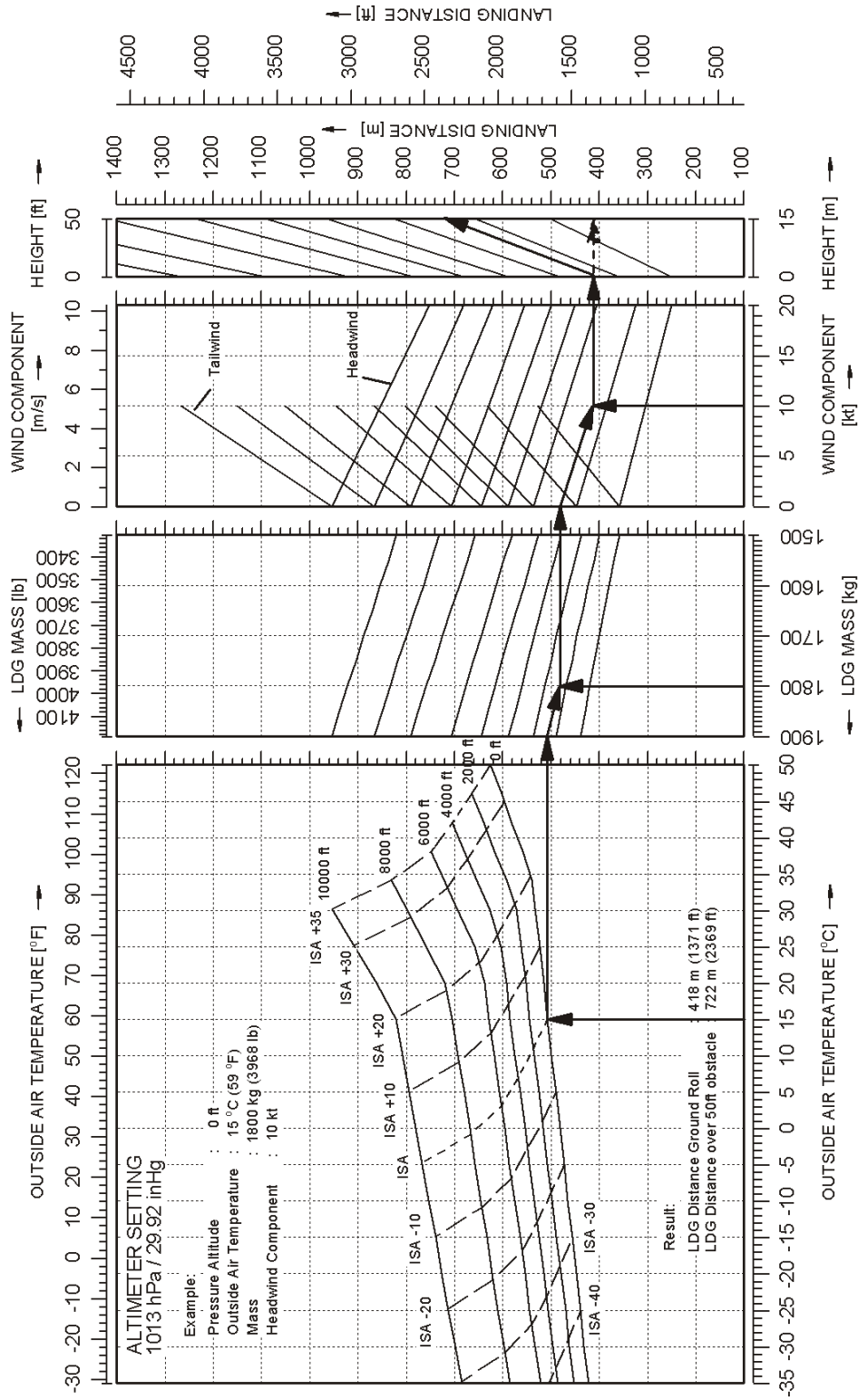


DA 42 NG - LANDING DISTANCES - FLAPS LDG



Conditions: Flaps: LDG, Power: both IDLE, Runway: level and hard, dry surface, Approach speed: 84 KIAS

DA 42 NG - LANDING DISTANCES - ABNORMAL FLAP POSITION



Conditions: Flaps: UP or APP, Power: both IDLE, Runway: level and hard, dry surface, Approach speed: 86 KIAS

**5.3.11 GRADIENT OF CLIMB ON GO-AROUND**

Conditions:

- Power lever ..... both MAX
- Flaps ..... LDG
- Landing gear ..... extended
- Airspeed: ..... 84 KIAS

Value for ISA and MSL, at 1805 kg (3979 lb)	
Constant gradient of climb	7.5 % (equals 4.3 climb angle) or 612 ft/min

**NOTE**

A landing with a mass between 1805 kg (3979 lb) and 1900 kg (4189 lb) is admissible. It constitutes an abnormal operating procedure.

Value for ISA and MSL, at 1900 kg (4189 lb)	
Constant gradient of climb	6.7 % (equals 3.8 climb angle) or 547 ft/min

**5.3.12 APPROVED NOISE DATA**

Max. Flight Mass 1900 kg (4189 lb)

ICAO Annex 16 Chapter X, App.6 ..... 78,0 dB(A)

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## CHAPTER 6 MASS AND BALANCE

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6.2 DATUM PLANE .....	6-3
6.3 MASS AND BALANCE REPORT .....	6-4
6.4 FLIGHT MASS AND CENTER OF GRAVITY .....	6-6
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## **6.1 INTRODUCTION**

In order to achieve the performance and flight characteristics described in this Airplane Flight Manual and for safe flight operation, the airplane must be operated within the permissible mass and balance envelope.

The pilot is responsible for adhering to the permissible values for loading and center of gravity (CG). In this, he should note the movement of the CG due to fuel consumption. The permissible CG range during flight is given in Chapter 2.

The procedure for determining the flight mass CG position is described in this chapter. Additionally a comprehensive list of the equipment approved for this airplane exists (Equipment List). The set of items marked as 'installed' constitutes the *Equipment Inventory*.

Before the airplane is delivered, the empty mass and the corresponding CG position are determined and entered in Section 6.3 - MASS AND BALANCE REPORT.

### **NOTE**

Following equipment changes the new empty mass and the corresponding CG position must be determined by calculation or by weighing.

Following repairs or repainting the new empty mass and the corresponding CG position must be determined by weighing.

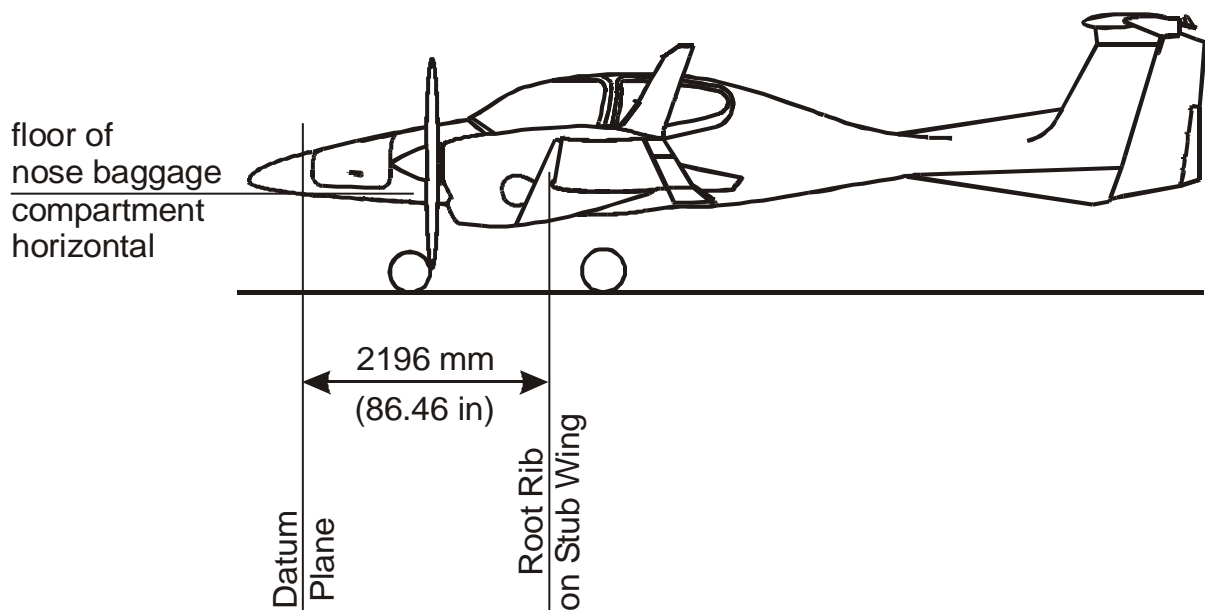
Empty mass, empty mass CG position, and the empty mass moment must be certified in the Mass and Balance Report by authorized personnel.

**NOTE**

Refer to Section 1.6 - UNITS OF MEASUREMENT for conversion of SI units to US units and vice versa.

**6.2 DATUM PLANE**

The Datum Plane (DP) is a plane which is normal to the airplane's longitudinal axis and in front of the airplane as seen from the direction of flight. The airplane's longitudinal axis is parallel with the floor of the nose baggage compartment. When the floor of the nose baggage compartment is aligned horizontally, the Datum Plane is vertical. The Datum Plane is located 2.196 meters (86.46 in) forward of the most forward point of the root rib on the stub wing.



### **6.3 MASS AND BALANCE REPORT**

The empty mass and the corresponding CG position established before delivery are the first entries in the Mass and Balance Report. Every change in permanently installed equipment, and every repair to the airplane which affects the empty mass or the empty mass CG must be recorded in the Mass and Balance Report.

For the calculation of flight mass and corresponding CG position (or moment), the *current* empty mass and the corresponding CG position (or moment) in accordance with the Mass and Balance Report must always be used.

Condition of the airplane for establishing the empty mass:

- Equipment as per Equipment Inventory (see Section 6.5)
- Including the following operating fluids:
  - brake fluid
  - hydraulic fluid (for the retractable gear)
  - engine oil (2 x 7 liters = 2 x 7.4 qts)
  - coolant (2 x 7.5 liters = 2 x 7.93 qts)
  - gearbox oil (2 x 2.1 liters = 2 x 2.22 qts)
  - unusable fuel in main fuel tanks (2 x 1 US gal = 2 x 3.79 liters)
  - unusable fuel in auxiliary fuel tanks ( if installed, 2 x 0.5 US gal = 2 x 1.89 liters)



**MASS AND BALANCE REPORT**

Serial No.:	Registration:	Page No.:	Changes in mass			Current empty mass															
			Addition (+)			Subtraction (-)															
			Mass	Mo-ment Arm	Mo-ment	Mass	Mo-ment Arm	Mo-ment													
DA 42NG	Description of part or Modification	Entry No.:	IN	OUT	Upon delivery																
Date																					

## **6.4 FLIGHT MASS AND CENTER OF GRAVITY**

The following information enables you to operate your DA 42 NG within the permissible mass and balance limits. For the calculation of the flight mass and the corresponding CG position the following tables and diagrams are required:

6.4.1 - MOMENT ARMS

6.4.2 - LOADING DIAGRAM

6.4.3 - CALCULATION OF LOADING CONDITION

6.4.4 - PERMISSIBLE CENTER OF GRAVITY RANGE

6.4.5 - PERMISSIBLE MOMENT RANGE

The diagrams should be used as follows:

1. Take the empty mass and the empty mass moment of your airplane from the Mass and Balance Report, and enter the figures in the appropriate boxes under the column marked 'Your DA 42 NG' in Table 6.4.3 - CALCULATION OF LOADING CONDITION.
2. Read the fuel quantity indicators to determine the fuel quantity in the main fuel tanks.
3. Determine the fuel quantity in the auxiliary fuel tanks (if installed).

To verify an empty auxiliary fuel tank, set the ELECT. MASTER switch and the AUX PUMP switch to ON and check the PFD for the L/R AUX FUEL E caution message.

To verify a full auxiliary fuel tank open the auxiliary fuel tank filler and check fuel level.

If the auxiliary fuel tank quantity is in between empty and full, the exact quantity cannot be determined. If possible transfer all fuel to the main fuel tank by setting the ELECT. MASTER switch and the AUX PUMP switch to ON until the L/R AUX FUEL E caution message appears on the PFD. During this procedure ground power must be used or at least one engine must be running. The fuel transfer will take a maximum of 10 minutes.

### CAUTION

If the auxiliary tanks are in use, both tanks must be refueled to the maximum level to provide proper information for the pilot about the fuel quantity in the auxiliary fuel tanks.

If the auxiliary tanks are not in use, the pilot must ensure that they are empty.

4. Multiply the individual masses by the moment arms quoted to obtain the moment for every item of loading and enter these moments in the appropriate boxes in Table 6.4.3 - CALCULATION OF LOADING CONDITION.
5. Add up the masses and moments in the respective columns. The CG position is calculated by dividing the total moment by the total mass (using row 8 for the condition with empty fuel tanks, and row 11 for the pre take-off condition). The resulting CG position must be inside the limits.

As an illustration the total mass and the CG position are entered on Diagram 6.4.4 - PERMISSIBLE CENTER OF GRAVITY RANGE. This checks graphically that the current configuration of the airplane is within the permissible range.

6. Graphical method:

Diagram 6.4.2 - LOADING DIAGRAM is used to determine the moments. The masses and moments for the individual items of loading are added. Then Diagram 6.4.5 - PERMISSIBLE MOMENT RANGE is used to check whether the total moment associated with the total mass is in the permissible range.

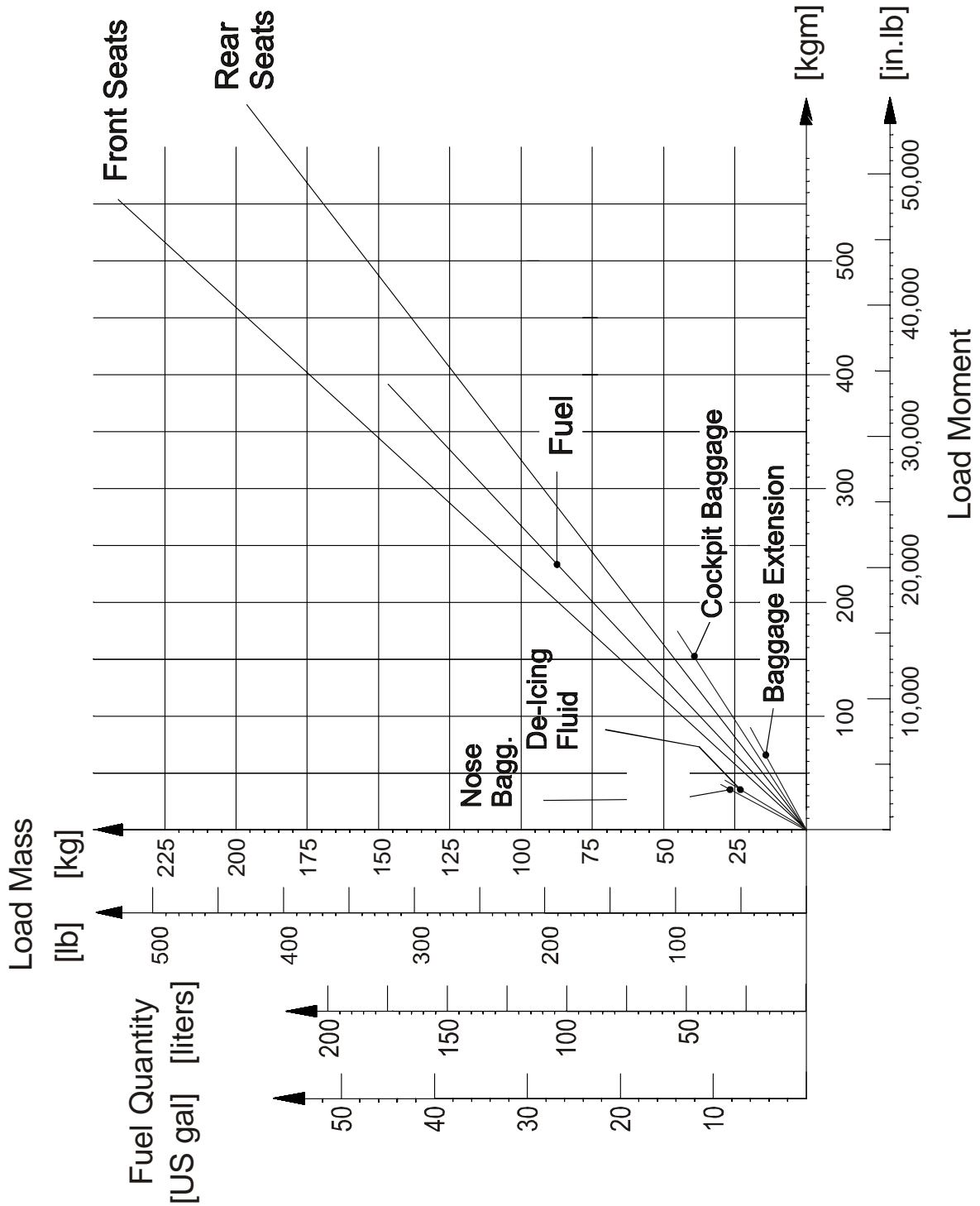
The result found with the graphical method is however inaccurate. In doubtful cases the result must be verified using the exact method given above.

### 6.4.1 MOMENT ARMS

The most important lever arms aft of the Datum Plane:

Item		Lever Arm	
		[m]	[in]
Occupants on front seats		2.30	90.6
Occupants on rear seats		3.25	128.0
Fuel	in main tanks	2.63	103.5
	in auxiliary tanks (if installed)	3.20	126.0
De-icing fluid (if equipment installed, OAM 42-053)		1.00	39.4
Baggage in compartments	nose	0.60	23.6
	cabin	3.89	153.1
	extension	4.54	178.7

6.4.2 LOADING DIAGRAM



### **6.4.3 CALCULATION OF LOADING CONDITION**

#### **NOTE**

If the optional de-icing system (OÄM 42-053) is installed, the following must be observed:

The consumption of fuel causes a forward movement of the CG. The consumption of de-icing fluid causes a rearward movement of the CG. Depending on the fuel flow and de-icing fluid flow, the overall movement of the CG can be a forward or a rearward movement. In order to cover all possible cases, the following table must be completed twice: with (as shown in the example) and without considering the on-board de-icing fluid. All four CG positions (fuel tank full/empty, de-icing fluid tank full/empty) must fall into the permitted area.

1. Complete the form on the next page.
2. Divide the total moments from rows 8 and 11 by the related total mass to obtain the CG positions.

In our example: empty tanks:       $3958.7 \text{ kgm} / 1655.5 \text{ kg} = 2.391 \text{ m}$   
 $343,717 \text{ in.lb} / 3651.0 \text{ lb} = 94.14 \text{ in}$

full tanks:               $4645.7 \text{ kgm} / 1898.5 \text{ kg} = 2.447 \text{ m}$   
 $403,356 \text{ in.lb} / 4187.0 \text{ lb} = 96,335 \text{ in}$

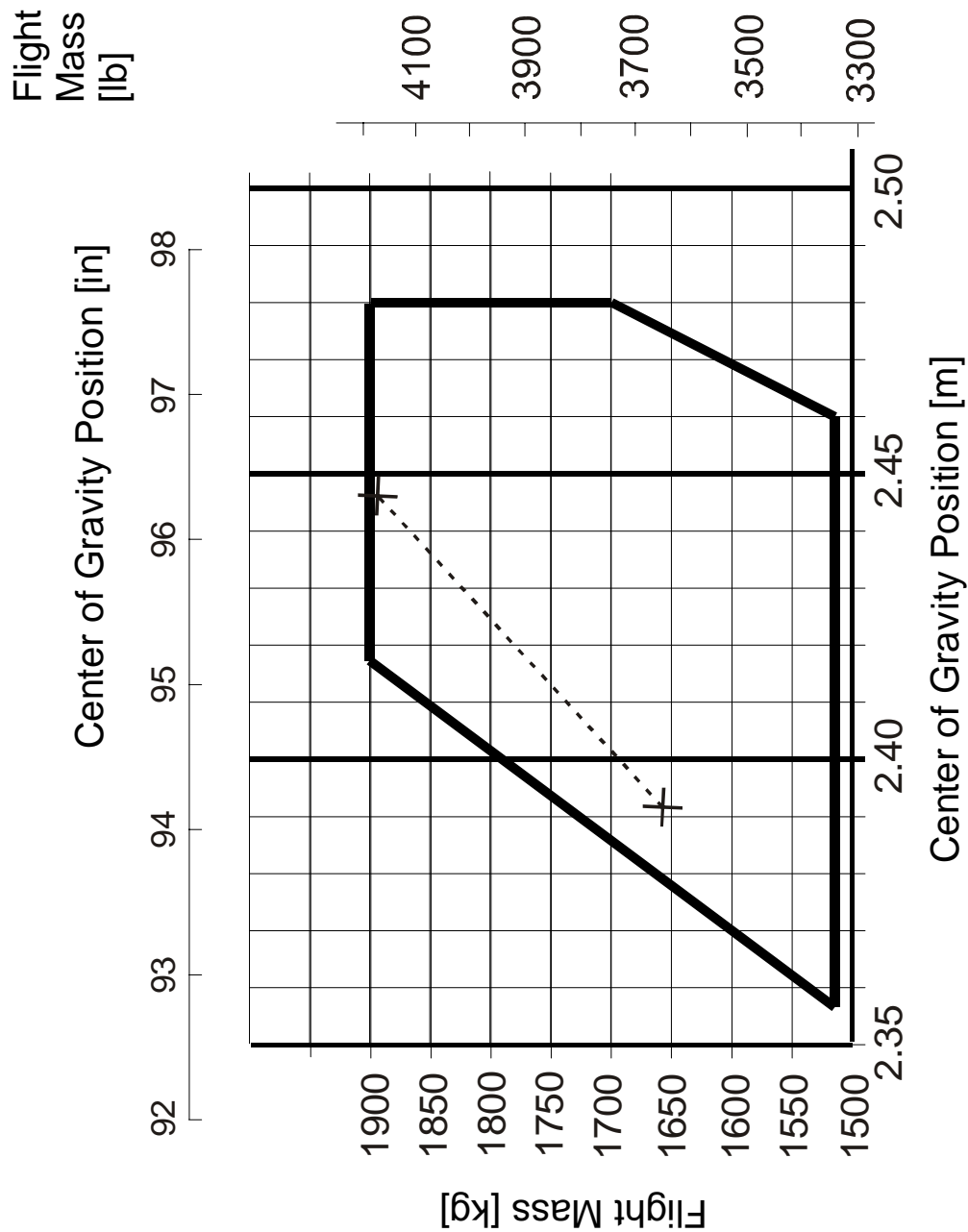
3. Locate the values in the diagram in Section 6.4.4 - PERMISSIBLE CENTER OF GRAVITY RANGE. If the CG positions and related masses fall into the permitted area, the loading condition is allowable.

Our example shows allowable loading conditions.

CALCULATION OF LOADING CONDITION	DA 42 NG (Example)		Your DA 42 NG	
	Mass [kg] [lb]	Moment [kgm] [in.lb]	Mass [kg] [lb]	Moment [kgm] [in.lb]
1. Empty mass (from Mass and Balance Report)	1450 3197	3488.0 302,747		
2. Front seats Lever arm: 2.30 m (90.6 in)	160 353	368.0 31,982		
3. Rear seats Lever arm: 3.25 m (128.0 in)	0 0	0.0 0,0		
4. Nose baggage compt. Lever arm: 0.60 m (23.6 in)	0 0	0.0 0,0		
5. Cabin baggage compt. Lever arm: 3.89 m (153.1 in)	10 22	38.9 3,368		
6. Baggage extension Lever arm: 4.54 m (178.7 in)	8 18	36.3 3,217		
7. De-icing fluid (if installed; see NOTE on previous page) (1.1 kg/liter) (9.2 lb/US gal) Lever arm: 1.00 m (39.4 in)	27.5 61	27.5 2,403		
8. Total mass & total moment with empty fuel tanks (Total of 1.-7.)	1655.5 3651	3958.7 343,717		
9. Usable fuel, main tanks (0.84 kg/liter) (7.01 lb/US gal) Lever arm: 2.63 m (103.5 in)	159 351	418.2 36,329		
10. Usable fuel, auxiliary tanks (if installed) (0.84 kg/liter) (7.01 lb/US gal) Lever arm: 3.20 m (126.0 in)	84 185	268.8 23,310		
11. Total mass & total moment with fuel & de-icing fluid (Total of 8. through 10.)	1898.5 4187	4645.7 403,356		

The CG's shown in the following diagrams are those from the example in Section 6.4.3 - CALCULATION OF LOADING CONDITION, rows 8 and 11.

**6.4.4 PERMISSIBLE CENTER OF GRAVITY RANGE**





The flight CG position must be within the following limits:

Most forward flight CG:

2.357 m (92.80 in) aft of datum plane at 1510 kg (3329 lb)

2.418 m (95.20 in) aft of datum plane at max. take-off mass (see Section 2.7)  
linear variation in between

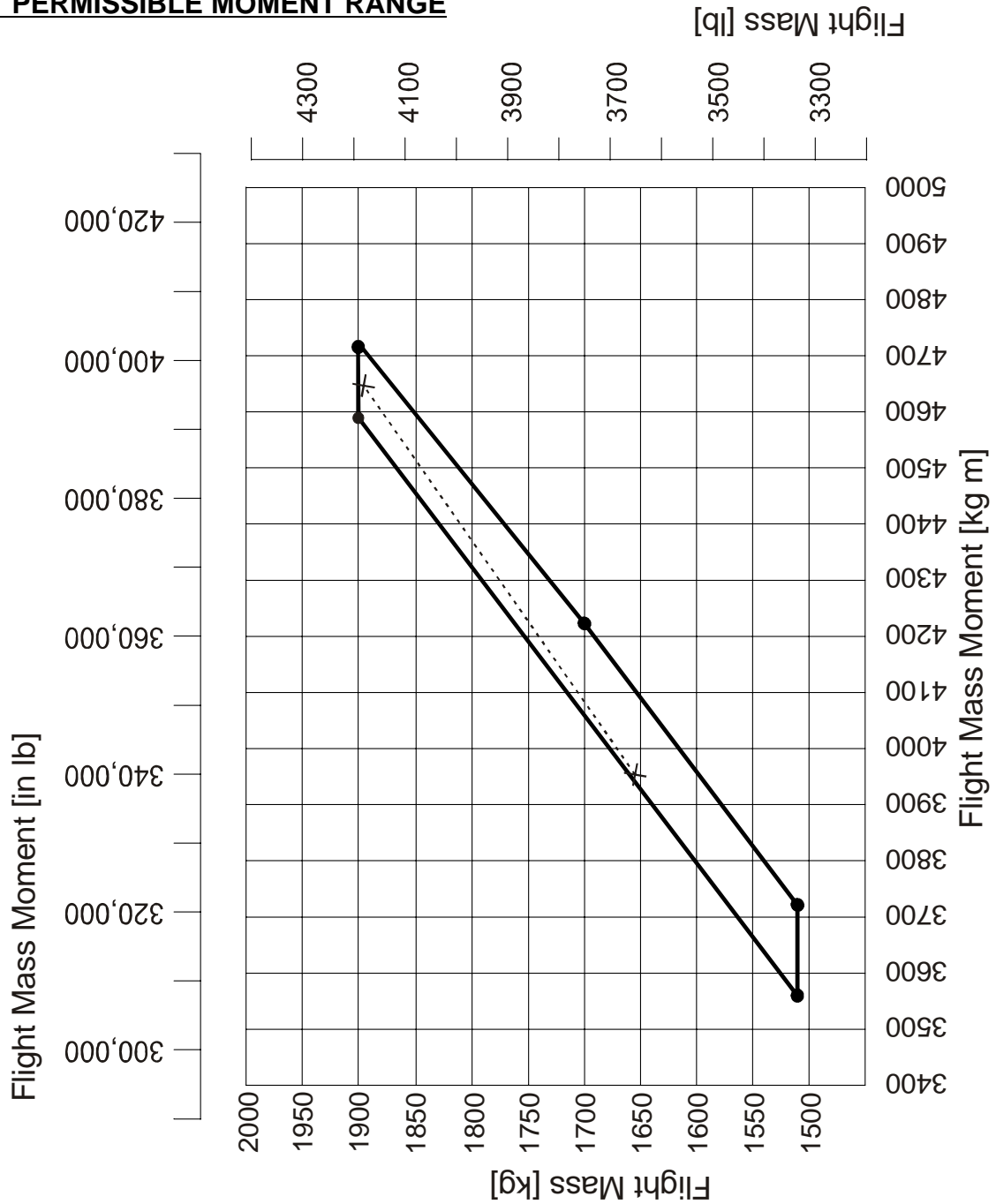
Most rearward flight CG:

2.460 m (96.85 in) aft of datum plane at 1510 kg (3329 lb)

2.480 m (97.64 in) aft of datum plane at 1700 kg (3748 lb)

2.480 m (97.64 in) aft of datum plane at max. take-off mass (see Section 2.7)  
linear variation in between

**6.4.5 PERMISSIBLE MOMENT RANGE**



The flight mass moments shown in the diagram are those from the example in Table 6.4.3 (a) - CALCULATION OF LOADING CONDITION, rows 8 and 11.

## **6.5 EQUIPMENT LIST AND EQUIPMENT INVENTORY**

All equipment that is approved for installation in the DA 42 NG is shown in the *Equipment List* below.

### **NOTE**

The equipment listed below cannot be installed in any arbitrary combination. The airplane manufacturer must be contacted before removing or installing equipment, with the exception of replacing a unit by an identical unit.

The items of equipment installed in your particular airplane are indicated in the appropriate column. The set of items marked as 'installed' constitutes the *Equipment Inventory*.

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Airplane Serial No.:		Registration:			Date:		Mass		Lever Arm	
Description	Type	Part No.	Manufacturer	S/N	installed	lb	kg	in	m	
<b>AVIONICS COOLING</b>										
Avionics cooling fan	SAFE 328	305 467-00	Sandia Aerospace							
PFD cooling fan	SAFE 128	305 468-00	Sandia Aerospace							
MFD cooling fan	SAFE 128	305 468-00	Sandia Aerospace							
<b>AUTOPILOT SYSTEM</b>										
Pitch servo	GSA 81	011-00878-00	Garmin							
Pitch servo mount	GSM 85	011-00894-07	Garmin							
Roll servo	GSA 81	011-00878-00	Garmin							
Roll servo mount	GSM 85	011-00894-07	Garmin							
Pitch trim servo	GSA 81	011-00878-00	Garmin							
Pitch trim servo mount	GSM 85	011-00894-04	Garmin							
Yaw servo	GSA 80	011-00877-00	Garmin							
Yaw servo mount	GSM 85	011-00894-08	Garmin							
Control stick		DA4-2213-12-90	Diamond Aircraft							
CWS switch		031-00514-0000	Bendix/King							
AP-Disc switch		031-00428-0000	Bendix/King							
Trim switch assy		200-09187-0000	Bendix/King							
<b>ELECTRICAL POWER</b>										
Main battery	RG24-15(M)		Concorde							
Emergency battery		D60-2560-91-00	Diamond Aircraft							



Airplane Serial No.:		Registration:		Date:		Mass		Lever Arm	
Description	Type	Part No.	Manufacturer	S/N	installed	lb	kg	in	m
ECU backup battery LH (2 pcs.)	LC-R127R2P		Panasonic						
ECU backup battery RH (2 pcs.)	LC-R127R2P		Panasonic						
External power connector		DA4-2443-10-00	Diamond Aircraft						
<b>EQUIPMENT</b>									
Safety belt, pilot	5-01-0 Series	5-01-1C0710	Schroth			2.110	0.960	92.520	2.350
Safety belt, co-pilot	5-01-0 Series	5-01-1C5710	Schroth			2.110	0.960	92.520	2.350
Safety belt, LH pax	5-01-0 Series	5-01-1B5710	Schroth			2.250	1.020	126.800	3.220
Safety belt, RH pax	5-01-0 Series	5-01-1B0710	Schroth			2.250	1.020	126.800	3.220
Safety belt, pilot	5-01-0 Series	5-01-2G0710	Schroth			2.110	0.960	92.520	2.350
Safety belt, co-pilot	5-01-0 Series	5-01-2G5710	Schroth			2.110	0.960	92.520	2.350
Safety belt, LH pax	5-01-0 Series	5-01-2H5710	Schroth			2.250	1.020	126.800	3.220
Safety belt, RH pax	5-01-0 Series	5-01-2H0710	Schroth			2.250	1.020	126.800	3.220
Safety belt, pilot	5-01-0 Series	5-01-2G0701	Schroth			2.110	0.960	92.520	2.350
Safety belt, co-pilot	5-01-0 Series	5-01-2G5701	Schroth			2.110	0.960	92.520	2.350
Safety belt, LH pax	5-01-0 Series	5-01-2H5701	Schroth			2.250	1.020	126.800	3.220
Safety belt, RH pax	5-01-0 Series	5-01-2H0701	Schroth			2.250	1.020	126.800	3.220
ELT unit	ME406	453-6603	Artex			2.770	1.260	179.700	4.565
ELT remote switch		345-6196-04	Artex						
ELT antenna		110-338	Artex			0.470	0.213	152.800	3.880
Buzzer		130-4004	Artex						



Airplane Serial No.:		Registration:		Date:		Mass		Lever Arm	
Description	Type	Part No.	Manufacturer	S/N	installed	lb	kg	in	m
<b>SAFETY EQUIPMENT</b>									
Fire extinguisher		HAL 1	AIR Total						
First aid kit									
<b>FLIGHT CONTROLS</b>									
Flaps actuator assy		43055	Kruitz						
Lift detector		C-99701-1	Safe Flight Instr.						
Stall warning buzzer	SC Series	SC 628 ND	Mallory						
Variable elevator stop		D64-2733-12-00	Diamond Aircraft						
<b>HYDRAULIC</b>									
Motor pump unit		X11-0001-00-00.00R0	Hydraulik Mayer						
Hydraulic fluid tank		X11-0002-00-00.00R0	Hydraulik Mayer						
Hydraulic control unit		X11-0003-00-00.00R0	Hydraulik Mayer						
High pressure filter		X11-0004-00-00.00R0	Hydraulik Mayer						
Hydraulic pressure accumulator		X11-0005-00-00.00R0	Hydraulik Mayer						
MLG hydraulic cylinder		X11-0006-00-00.00/1R0	Hydraulik Mayer						
MLG hydraulic cylinder		X11-0006-00-00.00/1R0	Hydraulik Mayer						
MLG hydraulic cylinder		X11-0006-00-00.00/2R0	Hydraulik Mayer						
Brake master cylinder (2 pcs.)		10-54A	Cleveland						
Parking valve		60-5B	Cleveland						
Brake assembly		30-239A	Cleveland						



Airplane Serial No.:		Registration:		Date:		Mass		Lever Arm	
Description	Type	Part No.	Manufacturer	S/N	installed	lb	kg	in	m
<b>INDICATING / REC. SYSTEM</b>									
Primary flight display (PFD)	GDU 1040	011-00972-03	Garmin			6.400	2.910	70.080	1.780
Multi function display (MFD)	GDU 1045	011-00819-04	Garmin			6.400	2.910	70.080	1.780
<b>LANDING GEAR</b>									
Main landing gear LH		D60-3217-11-00	Diamond Aircraft						
Main landing gear RH		D60-3217-12-00	Diamond Aircraft						
Nose landing gear		D60-3223-10-00	Diamond Aircraft						
LDG gear warning	SC Series	SC 628 NDP	Mallory						
<b>LIGHTS</b>									
Map / Reading light assy crew		W1461.0.010	Rivoret						
Cabin Light		W1461.0.010	Rivoret						
Strobe / Pos. light assy LH	A600-PR-D-28	01-0790006-05	Whelen			1.590	0.719	103.800	2.638
Strobe / Pos. light assy RH	A600-PG-D-28	01-0790006-07	Whelen			1.590	0.719	103.800	2.638
Strobe light power supply LH/RH	A490ATS-CF-14/28	01-0770062-05	Whelen						
Taxi light	Xenon D1S		Aero Vision Int.			0.990	0.449	79.920	2.030
Taxi light power supply	XV1-28		Aero Vision Int.			0.880	0.400	82.290	2.090
Landing light	Xenon D1S		Aero Vision Int.			0.990	0.449	79.920	2.030
Landing light power supply	XV1-28		Aero Vision Int.			0.880	0.400	82.290	2.090
Glareshield lamp assy		DA4-3311-10-02	Diamond Aircraft						



Airplane Serial No.:		Registration:		Date:		Mass		Lever Arm	
Description	Type	Part No.	Manufacturer	S/N	installed	lb	kg	in	m
Glareshield light inverter		APVL328-4-1-L-5QF	Quantiflex						
Placards inverter		APVL328-4-1-L-15QF	Quantiflex						
<b>COMMUNICATION /</b>									
COMM #1 antenna	DMC63-1/A		DM			0.400	0.180	177.100	4.500
COMM #2 antenna	DMC63-2		DM			0.400	0.180	155.100	3.940
Audio panel / Marker / ICS	GMA 1347	011-00809-00	Garmin						
Headset, pilot	Echelon 100		Telex						
Headset, pilot	HMEC25-KAP-2	025-230-715	Sennheiser						
Headset, co-pilot	Echelon 100		Telex						
Headset, co-pilot	HMEC25-KAP-2	025-230-715	Sennheiser						
Headset, LH pax	Echelon 100		Telex						
Headset, LH pax	HMEC25-KAP-2	025-230-715	Sennheiser						
Headset, RH pax	Echelon 100		Telex						
Headset, RH pax	HMEC25-KAP-2	025-230-715	Sennheiser						
Speaker	FRS8 / 4 Ohms		Visaton						
Handmic	100 TRA	62800-001	Telex						
Pitot / Static probe, heated	AN5814-2	PST-305	Aeroinstruments						
Alternate static valve		DA4-3111-51-00	Diamond Aircraft						
Backup altimeter		5934PD-3	United Instruments			0.496	0.225	70.080	1.780
Backup altimeter	LUN 1120	1120.23B2X	Mikrotechna						
Backup airspeed indicator	8030	8030-B-884	United Instruments			0.680	0.308	70.080	1.780
Backup artificial horizon	4300	4300-206	Mid Continent Instr.			2.500	1.132	70.080	1.780
Magnetic compass		PG2C-28V	SIRS Navigation						





Airplane Serial No.:		Registration:		Date:		Mass		Lever Arm	
Description	Type	Part No.	Manufacturer	S/N	installed	lb	kg	in	m
OAT probe	GTP 59	011-00978-00	Garmin						
Digital air data system	GDC74A	011-00882-00	Garmin			1.580	1.580	70.080	1.780
Digital air data system	GDC 74A	010-00336-10	Garmin			1.580	0.720	70.080	1.780
Integrated avionics #1	GIA 63W	010-00386-10	Garmin			5.290	2.400	154.900	3.935
Integrated avionics #2	GIA 63W	010-00386-10	Garmin			5.290	2.400	154.900	3.935
Transponder	GTX 33	011-00779-10	Garmin			3.030	1.380	153.100	3.890
Altitude / Heading reference system	GRS 77	011-00868-10	Garmin			2.540	1.150	154.900	3.935
Magnetometer	GMU 44	011-00870-00	Garmin			0.379	0.172	103.800	2.638
VOR / LOC / GS antenna	CI 157P		Comant						
Dual VOR / dual GS duplexer	CI 1125		Comant						
LH: VOR / LOC / GS antenna	CI120-1		Comant						
RH: VOR / LOC / GS antenna	CI120-1		Comant						
VOR / LOC / GS PWR combiner	CI120-3		Comant						
Transponder antenna	KA 61	071-00221-0010	Bendix/King						
Marker antenna	CI 102		Comant						
GPS #1 antenna	GA 36	013-00244-00	Garmin			0.400	0.180	104.100	2.645
GPS #2 antenna	GA 36	013-00244-00	Garmin			0.400	0.180	104.100	2645
DME	KN 63	066-1070-01	Bendix/King			2480	1.120	141.100	3.580
DME antenna	KA 61	071-00221-0010	Bendix/King						
ADF receiver	RA 3502-(01)	0505.757-912	Becker			2.080	0.940	155.500	3.950
ADF / RMI converter	AC 3504-(01)	0856.010-912	Becker			1.300	0.590	165.400	4.200
ADF antenna	AN 3500	0832.601-912	Becker			3.450	1.560	133.900	3.400
Stormscope	WX-500	805-11500-001	L-3 (Goodrich)			2.290	1.040	140.100	3.560
Stormscope antenna	NY-163	805-10930-001	L-3 (Goodrich)			0.820	0.370	280.700	7.130
TAS processor	TAS 600	70-2420-x TAS600	Avidyne/Ryan						
TAS processor	TAS 610	70-2420-x TAS610	Avidyne/Ryan			6.800	3.100	164.300	4.175

Airplane Serial No.:		Registration:		Date:		Mass		Lever Arm	
Description	Type	Part No.	Manufacturer	S/N	installed	lb	kg	in	m
TAS processor	TAS 620	70-2420-x TAS620	Avidyne/Ryan						
TAS processor	9900BX	70-2420-x	Avidyne/Ryan						
Transponder coupler		70-2040	Avidyne/Ryan			0.500	0.230	197.600	5020
TAS antenna, top		S72-1750-31L	Sensor Systems			0.660	0.298	164.800	4.188
TAS antenna, bottom		S72-1750-32L	Sensor Systems			0.750	0.340	104.300	2.650
Data link processor	GDL69A	011-00987-00	Garmin			2.490	1.130	159.400	4.050
GDL antenna	GA 37	013-00245-00	Garmin						
<b>OXYGEN SYSTEM</b>									
Oxygen cylinder (empty)		1270152-2	Aerox			7.400	3.357	32.280	0.820
Single outlet manifold LH		4110-401-2	Aerox			0.230	0.104	69.690	1.770
Single outlet manifold RH		4110-401-2	Aerox			0.230	0.104	69.690	1.770
Dual outlet manifold		4110-400-2	Aerox			0.420	0.191	109.300	2.775
Oxygen pressure regulator		4110-110	Aerox			0.740	0.336	21.260	0.540
Filling block		4110-405	Aerox			0.540	0.245	28.150	0.715
Pressure gauge		4110-490	Aerox			0.110	0.050	70.080	1.780
<b>ENGINE</b>									
LH engine	E4-B	E4B-00-000-000	Austro Engine						
RH engine	E4-B	E4B-00-000-000	Austro Engine						
LH engine control unit	EECU-E4-01	E4A-92-100-00-010	Austro Engine						
RH engine control unit	EECU-E4-01	E4A-92-100-00-010	Austro Engine						
ECU software		Refer to DAI Service Bulletin MSB-42NG-002	Austro Engine						



Airplane Serial No.:	Registration:		Date:	Mass		Lever Arm				
	Type	Part No.		Manufacturer	S/N	installed	lb	kg	in	m
<b>ENGINE STARTING</b>										
Glow plug control unit LH/RH		E4A-94-200-000	Austro Engine							
Starter LH / RH		E4A-93-000-000	Austro Engine							
<b>ELECTRICAL POWER</b>										
LH alternator		E4A-91-000-000	Austro Engine							
RH alternator		E4A-91-000-000	Austro Engine							
LH alternator regulator		E4A-91-100-000	Austro Engine							
RH alternator regulator		E4A-91-100-000	Austro Engine							
<b>ENGINE FUEL PUMPS</b>										
LH fuel pumps (2x)		0-580-054-001	Bosch							
RH fuel pumps (2x)		0-580-054-001	Bosch							
<b>ENGINE FIRE WARNING</b>										
LH overheat detector		X 2003-2	Control Products, Inc.							
RH overheat detector		X 2003-2	Control Products, Inc.							
<b>ENGINE INDICATING</b>										
Engine / Airframe unit	GEA 71	011-00831-00	Garmin							



Airplane Serial No.:		Registration:		Date:		Mass		Lever Arm	
Description	Type	Part No.	Manufacturer	S/N	installed	lb	kg	in	m
<b>PROPELLER</b>									
Propeller LH	MTV-6-R-C-F/CF187-129		mt-propeller						
Propeller RH	MTV-6-R-C-F/CF187-129		mt-propeller						
Unfeathering accumulator LH		X11-0007-00-00	Hydraulik Mayer						
Unfeathering accumulator RH		X11-0007-00-00	Hydraulik Mayer						
Unfeathering accumulator LH		P-893	mt-propeller						
Unfeathering accumulator RH		P-893	mt-propeller						
Governor LH		P-877-16	mt-propeller						
Governor RH		P-877-16	mt-propeller						
<b>FUEL TANK SYSTEM</b>									
Fuel probe assy., LH inboard		D60-2817-13-00_1	Diamond Aircraft						
Fuel probe assy., RH inboard		D60-2817-13-00_1	Diamond Aircraft						
Fuel probe assy., LH outboard		D60-2817-14-00_1	Diamond Aircraft						
Fuel probe assy., RH outboard		D60-2817-14-00_1	Diamond Aircraft						
Alternate means for fuel qty.		D60-2817-90-00	Diamond Aircraft						
<b>AUX FUEL SYSTEM</b>									
LH auxiliary fuel pump		5100-09	Dukes			1.940	0.878	151.400	3.846
RH auxiliary fuel pump		5100-09	Dukes			1.940	0.878	151.400	3.846



Airplane Serial No.:	Registration:		Date:		Mass		Lever Arm		
	Type	Part No.	Manufacturer	S/N	installed	lb	kg	in	m
<b>ICE PROTECTION SYSTEM</b>									
Porous panel, outer wing, LH		12102-21	CAV Aerospace						
Porous panel, outer wing, RH		12102-22	CAV Aerospace						
Porous panel, center wing, LH		12102-23	CAV Aerospace						
Porous panel, center wing, RH		12102-24	CAV Aerospace						
Porous panel, horizontal tail, LH		12102-25	CAV Aerospace						
Porous panel, horizontal tail, RH		12102-26	CAV Aerospace						
Porous panel, vertical tail		12102-27	CAV Aerospace						
Inlet strainer		12121-02	CAV Aerospace						
Spray bar		12124-10	CAV Aerospace						
Metering pump 1		9513A-386	CAV Aerospace			4.180	1.896	40.160	1.020
Metering pump 2		9513A-386	CAV Aerospace			4.180	1.896	40.160	1.020
De-icing fluid tank		D60-3013-24-50	Diamond Aircraft			8.140	3.692	38.390	0.975
Mod filter assy 1		D60-3013-11-90	Diamond Aircraft			0.680	0.308	40.160	1.020
Mod filter assy 2		D60-3013-11-90	Diamond Aircraft			0.680	0.308	40.160	1.020
Solenoid valve		FV158H-28V	CAV Aerospace			0.870	0.395	40.160	1020
Solenoid valve		FV158H-28V	CAV Aerospace			0.870	0.395	40.160	1.020
High pressure switch		P041ED850	CAV Aerospace						
Proportioning unit, nacelle, LH		PU300DW142	CAV Aerospace						
Proportioning unit, nacelle, RH		PU300DW142	CAV Aerospace						
Tail bracket assembly		12132-03	CAV Aerospace			1070	485	278700	7080
Windshield pump 1		WP209A	CAV Aerospace			650	295	40160	1020
Windshield pump 2		WP209A	CAV Aerospace			650	295	40160	1020
De-ice control box		DAI-9030-00-01	Diamond Aircraft						



Airplane Serial No.:		Registration:		Date:		Mass		Lever Arm	
Description	Type	Part No.	Manufacturer	S/N	installed	lb	kg	in	m
<b>AIRPLANE FLIGHT MANUAL</b>									
		Doc. No. 7.01.15-E	Diamond Aircraft						

Place: \_\_\_\_\_

Date: \_\_\_\_\_

Signature: \_\_\_\_\_

## CHAPTER 7

# DESCRIPTION OF THE AIRPLANE AND ITS SYSTEMS

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## **7.1 INTRODUCTION**

Chapter 7 contains a description of the airplane and its systems, together with operating instructions.

For details about optional equipment see Chapter 9.

## **7.2 AIRFRAME**

### Fuselage

The CFRP fuselage is of semi monocoque molded construction. The center wing is attached to the fuselage with bolts. The two main spars and both nacelles are part of the center wing. The two main spars are CFRP items. The engine compartment in each nacelle is separated from the other structure with a firewall. The fire protection on the firewall is of a special fire-resistant matting, which is covered on the engine side by stainless steel cladding.

### Wings

The wings have a front and rear spar; each wing has a top shell and a bottom shell; The whole wing is 'fail-safe' design. The wings, as well as the ailerons and flaps, are made of GFRP/CFRP, and are principally of sandwich construction. An aluminum fuel tank is installed in each of the wings.

### Empennage

The airplane has a 'T' tail of GFRP/CFRP semi monocoque construction. Both the stabilizers have twin spars. Rudder and elevator are of sandwich construction.

### 7.3 FLIGHT CONTROLS

The ailerons, elevator and wing flaps are operated through control rods, while the rudder is controlled by cables. The flaps are electrically operated. Elevator forces can be balanced by a trim tab on the elevator, which is operated by a Bowden cable. Rudder forces can be balanced by a trim tab on the rudder, which is also operated by a Bowden cable.

#### Ailerons

Construction: GFRP/CFRP composite sandwich.

Hinges: There are 4 hinges, which are hinge pins mounted in an aluminum bracket. They are secured in position by a roll pin. The absence of this roll pin can lead to the loss of the hinge pin and a consequent loss of flight safety.

Operation: A rod end bearing is screwed into a steel push rod and locked by means of a jam nut which has locking varnish applied to it. Damage to this varnish can indicate a twisting and thus a change to the adjustment. The connection between the rod end bearing and the control horn is a bolt, the nut of which is likewise sealed with locking varnish.

The aluminum control horn is attached to the aileron with 3 screws.

## Flaps

The flaps are a two piece construction. The inner part of the flap is mounted to the center wing and the outer part to the wing. Both parts are connected to each other with a form fit connection.

Construction: GFRP/CFRP composite sandwich.

Hinges: There are 6 hinges at the outer part and 4 hinges at the inner part of the flap. These hinges are hinge pins mounted in an aluminum bracket. They are secured in position by a roll pin. The absence of this roll pin can lead to the loss of the hinge pin and a consequent loss of flight safety.

Operation: Each part is connected with a flap control horn to the push rods of the flap control system. A rod end bearing is screwed into a steel push rod and locked by means of a jam nut which has locking varnish applied to it. Damage to this varnish can indicate a twisting and thus a change to the adjustment. The connection between the rod end bearing and the control horn is a bolt, the nut of which is likewise sealed with locking varnish.

Each flap control horn is attached to the flap part with 3 screws.

The flaps are driven by an electric motor and have 3 settings:

- Cruise (UP), totally retracted
- Approach (APP), and
- Landing (LDG).

The flaps are operated by means of a 3-position flap selector switch on the instrument panel. The positions of the switch correspond to the positions of the flaps, the Cruise position of the switch being at the top. If the switch is moved to another position, the flaps continue to travel automatically until they have reached the position selected on the switch. The UP and LDG positions are additionally protected by a limit switch to guard against over-running the end positions.

The electrical flap drive has an automatic circuit breaker which can also be operated manually.

*Flap Position Indicator:*

The current flap position is indicated by means of three lights beside the flap selector switch.

When the upper light (green) is illuminated, the flaps are in the Cruise position (UP);

when the center light (white) is illuminated, the flaps are in Approach position (APP);

when the lower light (white) is illuminated, the flaps are in Landing position (LDG).

When two lights are illuminated simultaneously, the flaps are between the two indicated positions. This is the case only when the flaps are in transition.

Elevator

Construction: GFRP sandwich.

Hinges: 5 hinges.

Operation: Steel pushrods;

Two of the bellcrank bearings are accessible for visual inspection next to the lower hinge of the rudder. The elevator horn and its bearing, as well as the connection to the pushrod, can be visually inspected at the upper end of the rudder.

*Variable Elevator Stop:*

The DA 42 NG is equipped with an electrically operated actuator that limits the elevator-up travel to 13° as soon as the power setting of both engines exceeds approximately 20 % (approach power setting). This is 2.5° less than the 15.5° full deflection.

The linear actuator acts as a movable stop and is controlled by two switches, one for each power lever. When the power of one engine is reduced below approximately 20 % full elevator deflection is regained.

An amber annunciation (CAUTION) on the G1000 display is provided to inform the pilot in case a malfunction occurs. The annunciation illuminates when the variable stop should be in place and is actually not activated (power on condition) or should be retracted and actually limits the elevator travel (power off condition).

Rudder

Construction: GFRP sandwich.

Hinges: Upper hinge: One bolt.

Lower hinge: Bearing bracket including rudder stops, held by 4 screws to the rear web of the vertical stabilizer. The mating part on the rudder is a bracket which is attached to the rudder by 2 bolts. The bolts and nuts are accessible to visual inspection.

Operation: Steel cables, the eyes of which are connected to the bolts on the bracket.

### Elevator Trim

The trim control is a black wheel in the center console to the rear of the power lever. To guard against overrotating, the trim wheel incorporates a friction device. A mark on the wheel shows the take-off (T/O) position.

Turn wheel to the front = nose down

Turn wheel to the rear = nose up

### Rudder Trim

The trim control is a black wheel in the center console below the instrument panel. A mark on the wheel shows the center position and the direction of movement.

Turn wheel to the right = right turn

Turn wheel to the left = left turn

### Pedal Adjustment

#### **NOTE**

The pedals may only be adjusted on the ground!

The pedals are unlocked by pulling the black handle which is located behind the rear attachment.

#### *Forward Adjustment:*

Whilst keeping the handle pulled, push the pedals forward with your feet. Release the handle and allow the pedals to lock into place.

#### *Rearward Adjustment:*

Using the unlocking handle, pull the pedals back to the desired position. Release the handle and push the pedals forward with your feet until they lock into place.

Electrical Pedal Adjustment (Optional Equipment, OÄM 42-070)**NOTE**

The pedals may only be adjusted on the ground!

The pedals are adjusted using a rocker switch, located on the rear wall of the leg room. The related circuit breaker is located below the switch.

*Forward Adjustment:*

To move the pedals forward, depress lower side of switch. When pedals are in correct position, release switch.

*Rearward Adjustment:*

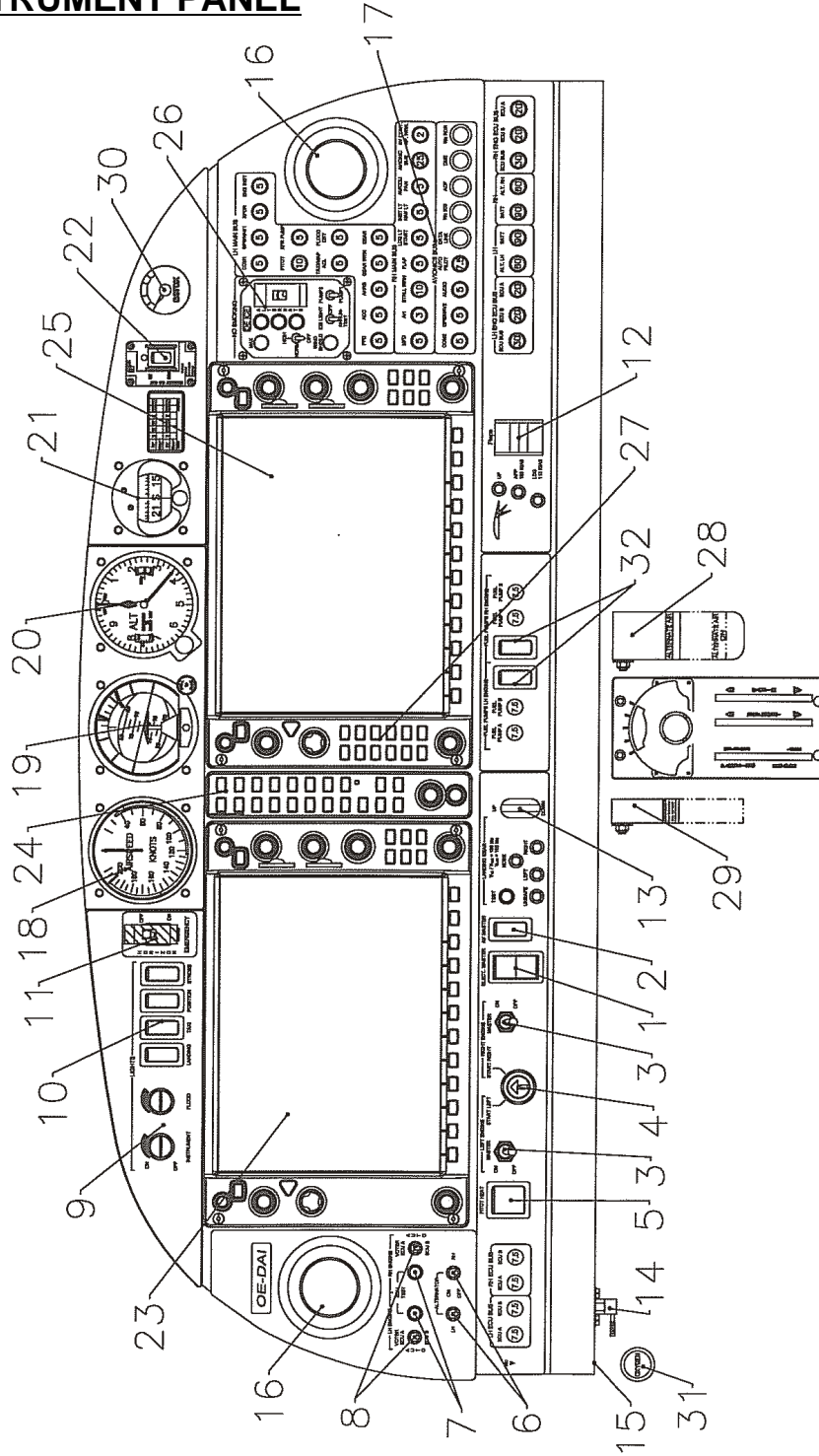
To move the pedals in the rearward direction, depress upper side of switch. When pedals are in correct position, release switch.

*Locking:*

Upon release the switch moves automatically to the 'power off' position, so locking the pedals in the present position.



**7.4 INSTRUMENT PANEL**



Major instruments and controls	
--------------------------------	--

1	Electric master switch	17	Circuit breakers*
2	Avionic master switch	18	Backup airspeed indicator
3	Engine master switches	19	Backup artificial horizon
4	Start switch	20	Backup altimeter
5	Pitot-/Stall warning heat switch	21	Emergency compass
6	Alternator switches	22	ELT control unit
7	ECU test buttons	23	Primary flight display (PFD)
8	VOTER switches	24	Audio amplifier / intercom / marker beacon receiver
9	Rotary buttons for instrument lighting and flood light	25	Multi function display (MFD)
10	Light switches	26	De-ice control panel
11	Emergency switch	27	Autopilot control unit (part of MFD)
12	Flap selector switch	28	Alt air lever
13	Landing gear switch	29	Landing gear emergency extension lever
14	Alternate static valve	30	Oxygen pressure indicator
15	Microphone socket	31	Oxygen control knob
16	Ventilation nozzles	32	Fuel pump switches

\*) Designations and abbreviations used to identify the circuit breakers are explained in Section 1.5 - DEFINITIONS AND ABBREVIATIONS.

### NOTE

The figure on previous page shows the typical DA 42 NG installation position for the equipment. The actual installation may vary due to the approved equipment version.

Cockpit Ventilation

Ventilation in the front is provided by spherical ventilation nozzles (16) in the instrument panel. Furthermore there are spherical nozzles in the roll bar on the left and right side next to the front seats as well as on the central console above the passengers' heads. The spherical nozzles are opened and closed by twisting.

## **7.5 LANDING GEAR**

The landing gear is a fully retractable, hydraulically operated, tricycle landing gear. Struts for the landing gear are air oil assemblies.

The hydraulic pressure for the landing gear operation is provided by an electrically powered hydraulic pump, which is activated by a pressure switch, when the required pressure is too low. Electrically actuated hydraulic valves, which are operated with the gear selector switch, provide the required hydraulic pressure for the movement of the landing gear. The gear selector switch is located on the instrument panel. The switch must be pulled out before it is moved to UP or DOWN position. Gear extension normally takes 6-10 seconds.

When the landing gear is retracted, the main wheels retract inboard into the center wing and the nose wheel retracts forward into the nose section. Hydraulic pressure on the actuators keeps the landing gear in the retracted position. A pressurized gas container acts as an accumulator which keeps the system pressure constant by replacing the volume lost due to the normal actuator leakages. This prevents a permanent starting of the hydraulic pump in flight.

Springs assist the hydraulic system in gear extension and locking the gear in the down position. After the gears are down and the downlock hooks engage, springs maintain force on each hook to keep it locked until it is released by hydraulic pressure.

The three green lights directly next to the landing gear operating switch illuminate to indicate that each gear is in the correct position and locked. If the gear is in neither the full up nor the full down position, a red warning light on the instrument panel illuminates.

Should one power lever be placed in a position below 25% while the landing gear is retracted, a warning horn sounds to alert the pilot that the gear is retracted. Additionally, a CHECK GEAR caution is indicated on the PFD. The same warning appears if the flaps move into position LDG (fully extended) while the gear is retracted.

To test the gear warning system (refer to 4A.6.1 - PRE-FLIGHT INSPECTION) push the test button close by the gear selector switch. The aural gear alert should appear.

### CAUTION

If the aural alert does not appear, an unscheduled maintenance is necessary.

To prevent inadvertent gear retraction on ground, an electric squat switch prevents the hydraulic valve from switching if the master switch is on and the gear extension switch is placed in the UP position.

After take-off, the gear should be retracted before an airspeed of 152 KIAS is exceeded. The landing gear may be extended at any speed up to 188 KIAS.

The landing gear is designed to be manually operated in the event of failure. Since the gear is held in the retracted position by hydraulic pressure, gravity will allow the gear to extend if the system fails for any reason. To extend and lock the gears in the event of failure, it is only necessary to relieve the hydraulic pressure by means of the emergency gear extension lever, which is located under the instrument panel to the left of the center console. Pulling this lever releases the hydraulic pressure and allows the gear to fall free. Before pulling the emergency gear extension lever, place the gear selector switch in the DOWN position.

### NOTE

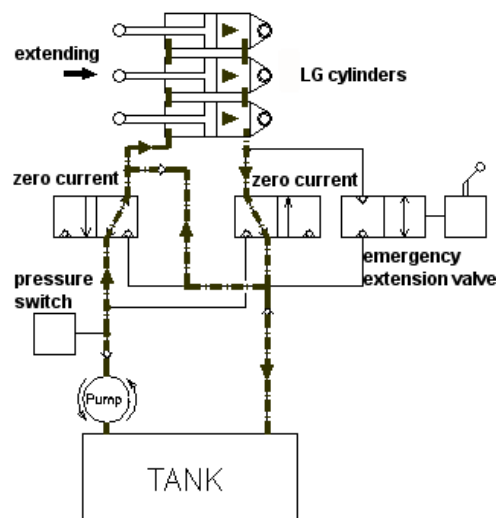
If the emergency gear extension has been pulled due to an emergency, the system has to be checked before pushing the lever in again.

The nose gear is steerable by the use of full rudder pedal travel. A gear damping element, incorporated in the nose gear steering system, prevents shimmy tendencies. When the gear is retracted, the nose wheel centers as it enters the wheel well, and the steering linkage disengages to reduce pedal loads in flight.

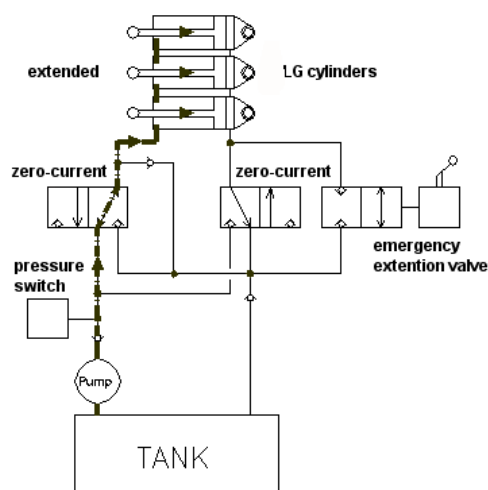
### Hydraulic Gear Extension System Schematic

The main landing gear of the DA 42 NG is extended with three hydraulic cylinders. The following schematic figures show the system conditions for each operating mode.

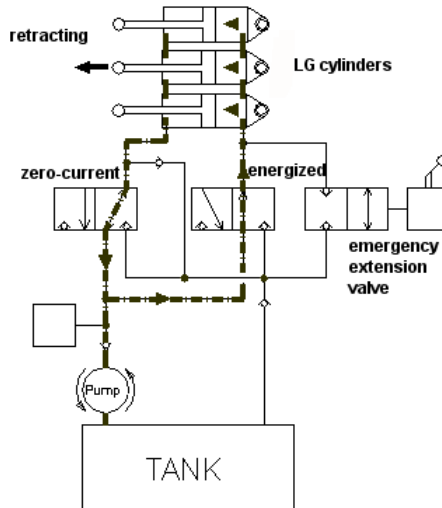
In figure 1 the extension of the landing gear is shown. To reduce the amount of pumped hydraulic fluid during this operation, the return flow is partly led into the feeding flow of the system.



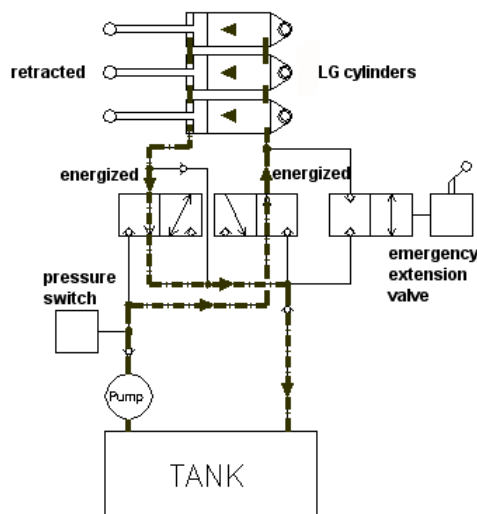
The figure below shows the system status when the landing gear is extended. All hydraulic cylinders are under high pressure.



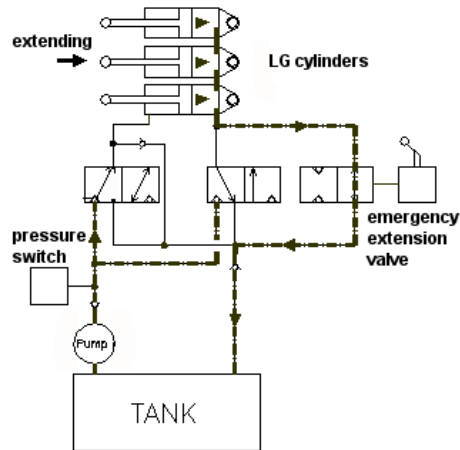
The operating mode for the retraction of the landing gear is shown in the next figure. While energizing the right hydraulic valve, the fluid flow in the hydraulic system is started due to different piston areas of the landing gear cylinders although the pressure on both sides of the system is equal.



While the landing gear is retracted both valves are energized and excessive hydraulic fluid on one side is drained into the tank. This configuration of the system is shown in the following figure.



For an emergency extension of the landing gear, the hydraulic fluid can pass through an emergency extension valve so that the gear is extended by gravity. The condition of the system is shown in the figure below.



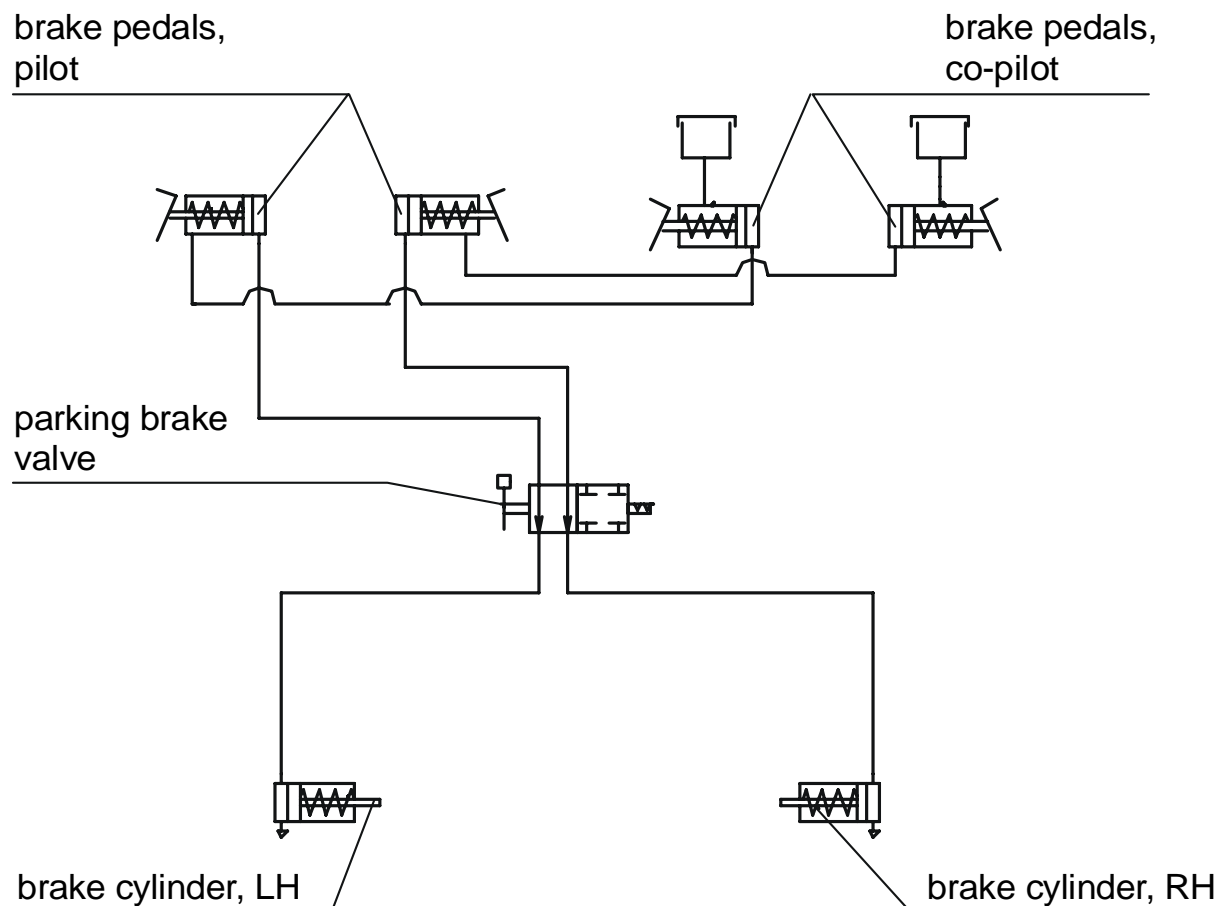


### Wheel Brakes

Hydraulically operated disk brakes act on the wheels of the main landing gear. The wheel brakes are individually operated by means of toe pedals.

### Parking Brake

The lever is located on the small center console under the instrument panel and is in the upper position when the brakes are released. To operate the parking brake, pull the lever downwards until it catches. Brake pressure is built up by multiple operation of the toe brake pedals, and is maintained until the parking brake is released. To release, the lever is pushed upwards.



## **7.6 SEATS AND SAFETY HARNESSSES**

To increase passive safety, the seats are constructed using a carbon fiber/Kevlar hybrid material and GFRP. The seats are removable to allow maintenance and inspection of the underlying controls. Covers on the control sticks prevent loose objects from falling into the area of the controls.

The seats have removable furnishings and are equipped with energy-absorbing foam elements.

The seats are fitted with three-part safety harnesses. The harnesses are fastened by inserting the end of the belts in the belt lock, and are opened by pressing the red release on the belt lock.

The backs of the rear seats can be laid forward after pulling upwards on the locking bolt knob.

If front seats with adjustable backrests are installed (OÄM 42-067), the angle of the backrests can be adjusted for best comfort. The backrest lever is situated on the outboard side of the backrest. However, during take-off, landing and emergency landing the backrests must be fixed in the upright position designated by a placard on the roll-over bar.

### **CAUTION**

Before the backrest lever is lifted in order to unlock the backrest, lean back towards the backrest to counteract the spring load; otherwise the backrest may snap forward.

### **CAUTION**

Do not apply a load of more than 90 daN (202 lbf) to the top of the backrest. Damage to the adjustment mechanism may otherwise result.

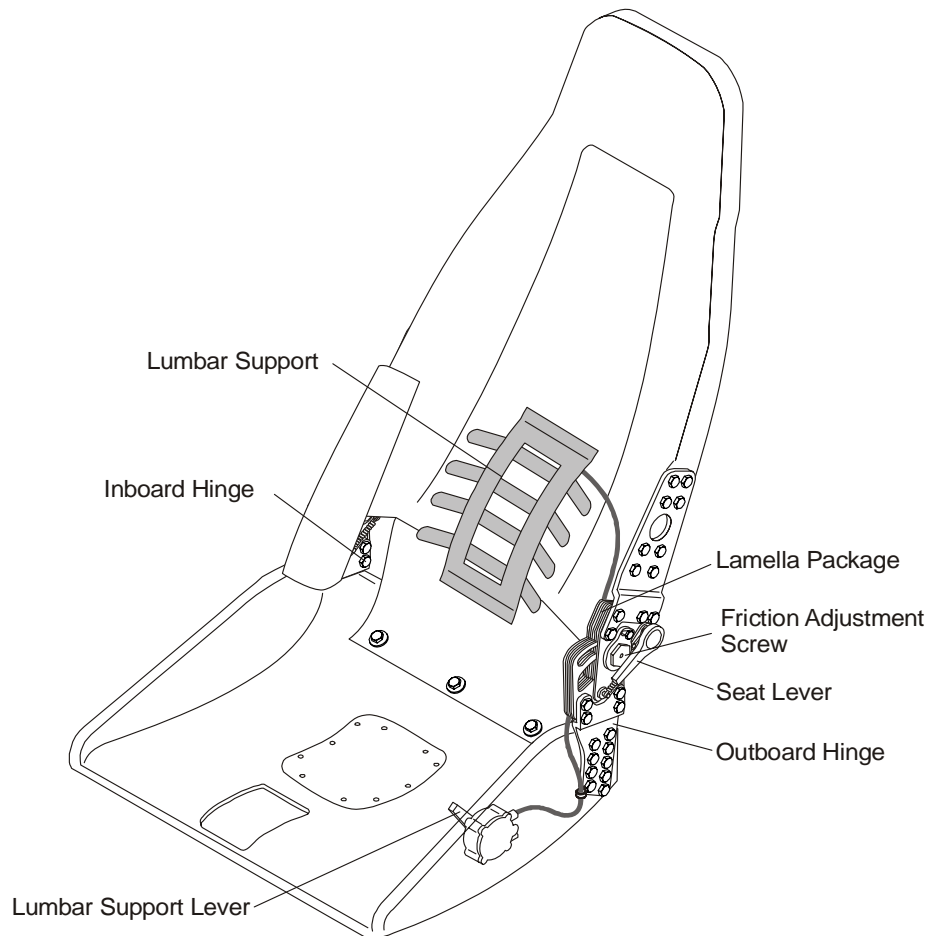
For adjustment lift the backrest lever and bend forward or backward to the desired backrest angle. Then lift the backrest lever fully, release and press down to set the friction lock.

In case of a defective adjustment mechanism the outboard friction adjustment screw can be tightened with a 10 mm hexagon nut in clockwise direction in order to fix the backrest in the upright position.

If possible, set the backrest lever to the locked position. The mechanism must be repaired at the next scheduled inspection.

The lumbar support can be adjusted by operating the lumbar support lever mounted on the outboard side of the seat pan.

*If seats with adjustable backrests are installed (OÄM 42-067):*



## **7.7 BAGGAGE COMPARTMENT**

There are two baggage compartments. One is located in the nose section and it is accessible through two compartment doors.

The other baggage compartment is behind the seat backs of the rear seats. Baggage may be loaded there provided it is restrained by means of a baggage net.

## **7.8 CANOPY, REAR DOOR, AND CABIN INTERIOR**

### Front Canopy

The front canopy is closed by pulling down on the canopy frame, following which it is locked by means of a handle on the left hand side of the frame. On locking, steel bolts lock into mating holes in polyethylene blocks.

"Cooling gap" position: a second setting allows the bolts to lock in, leaving a gap under the forward canopy.

The canopy can be blocked by a locking device on the left side near the canopy opening lever by turning the key clockwise. The closed and blocked canopy can be opened from inside by pulling the lever inside the opening handle.

### **WARNING**

The airplane may be operated with the front canopy in the "cooling gap" position on the ground only. Before take-off the front canopy must be completely closed and locked.

Do not block the front canopy with the locking key before flight in order to assure emergency evacuation from outside.

A window on the left and right hand side of the canopy can be opened for additional ventilation or as an emergency window.

### Rear Door

The rear door is closed in the same way, by pulling down on the frame and locking it with the handle. A gas pressure damper prevents the door from dropping; in strong winds the assembly must be securely held. The rear door is protected against unintentional opening by an additional lever.

The door can be blocked by a locking device on the left side near the door opening lever by turning the key clockwise. The closed and blocked door can be opened from inside by pulling the lever inside the opening handle.

### **WARNING**

Do not block the door with the locking key before flight in order to assure emergency access from outside.

### Heating and Ventilation

Heating and ventilation are operated using two levers located on the small center console under the instrument panel.

Right lever:	up	= HEATING ON (seats, floor)
	down	= HEATING OFF
Center lever :	up	= DEFROST ON (airflow to canopy)
	down	= DEFROST OFF

The heat of the RH engine is used for the front seats and floor, the heat of the LH engine is used to defrost the canopy.

The air inlet for the ventilation system is placed on the underside of the RH wing, inboard of the engine nacelle. The air is distributed within the cabin via 6 nozzles (2 on the instrument panel LH/RH side, 2 on the overhead panel and 2 on the LH/RH side of the passenger compartment). The jet direction of each cone can be changed easily and the jet intensity can be regulated by rotation of the nozzle.

## **7.9 POWER PLANT**

### **7.9.1 ENGINES, GENERAL**

There are two Austro Engine E4-B engines installed, which have the following specifications:

- Liquid-cooled four-cylinder four-stroke engine with wet sump lubrication
- Inline construction
- Common rail direct injection
- Propeller speed reducing gear 1:1.69
- Digital engine control with integrated propeller governor (separate oil system)
- Turbo charger with intercooler

Displacement:

Max. power: 123.5 kW (165.6 DIN-HP) at 2300 RPM at sea level and ISA

Max. continuous power: 113.6 kW (152.3 DIN-HP) at 2100 RPM at sea level and ISA

The indications for monitoring important engine parameters during operation are integrated within the Garmin G1000 display. Each engine can only be operated with the ENGINE MASTER switch ON. Each engine has an own ECU (Electrical Engine Control Unit) which receives its electrical power from the generator when at least one engine is running. When both engines are at standstill, the ECU receives its electrical power from the battery.

## 7.9.2 PROPELLER

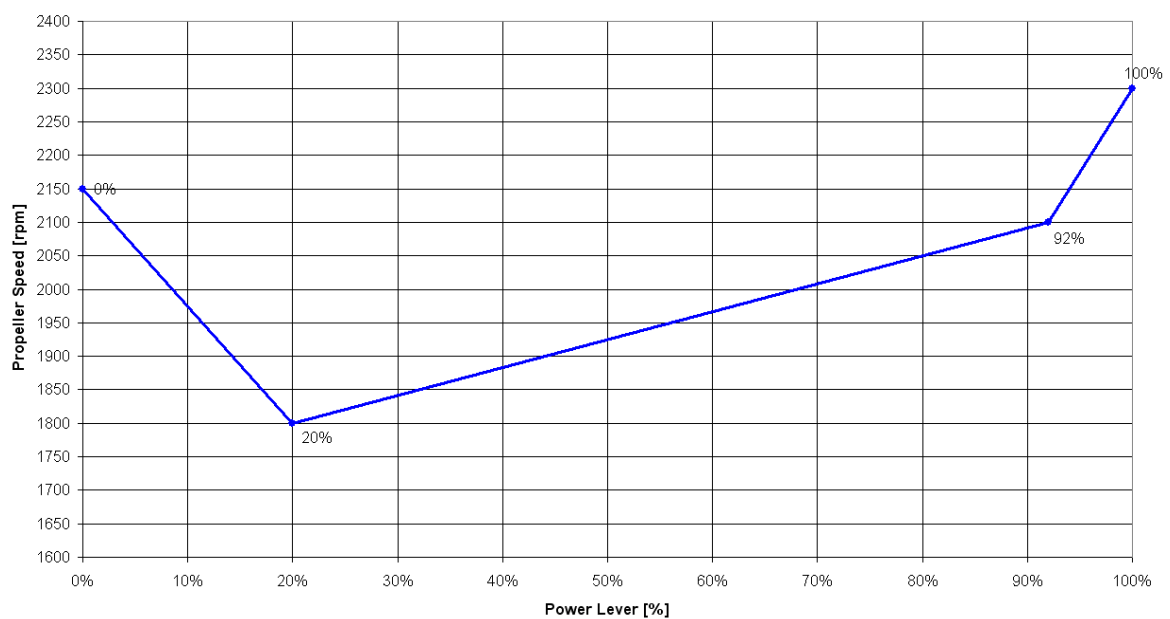
Two mt-Propeller MTV-6-R-C-F / CF 187-129 hydraulically regulated 3-bladed constant speed feathering propellers are installed. Each propeller has wood composite blades with fiber-reinforced plastic coating and stainless steel edge cladding; in the region of the propeller hub the leading edge is coated with adhesive PU foil. These blades combine the lowest weight whilst minimizing vibration.

### Propeller Control

The propeller pitch control system consists of the P-877-16 mt-Propeller governor valve. The pitch is set by the ECU via an electro-mechanical actuator on the governor. To change the blade pitch angle gearbox oil is pumped into the propeller hub. Increasing the oil pressure leads to a decrease of pitch and a higher RPM. Decreasing the pressure leads to higher pitch and a lower RPM.

Depending on the power setting the propeller pitch is adjusted such that the required RPM will be obtained as shown in the following diagram.

Propeller Setpoint Curve



*Pressure Accumulator:*

The pressure accumulator is a nitrogen oil type. It is connected to the gearbox oil circuit via an electric valve at the accumulator, which is operated with the ENGINE MASTER switch.

When the ENGINE MASTER switch is set to ON the valve is opened. When the engine is running, the accumulator is filled with oil at a pressure of approximately 22 bar (320 psi). During engine operation the accumulator makes sure that enough oil pressure is available even if the oil feed by the gearbox oil pump is decreasing due to negative acceleration. The hydraulic pressure keeps the propeller pitch angle below the start lock position, or moves the propeller blades beyond the start lock position.

*Feathering:*

To feather the propeller the engine must be shut down with the appropriate ENGINE MASTER switch. This will open the electric governor valve. All oil will flow back from the propeller hub, allowing the blades to move into the feathered pitch position. At the same time the electric valve at the pressure accumulator closes, and the oil pressure is restored in the accumulator.

Feathering is only possible at propeller speeds above 1300 RPM.

**CAUTION**

If the engine is shut down below an RPM of 1300 the propeller pitch remains below the start lock position. In this case the speed must be increased to increase the propeller RPM.



*Unfeathering:*

To unfeather the propeller, the associated ENGINE MASTER switch must be set to ON. This will open the electric valve at the pressure accumulator. The pressure stored in the accumulator will move the propeller blades into a low pitch position. As soon as the propeller starts turning and the gearbox oil operates, the accumulator will be refilled.

*Ground Operation:***CAUTION**

Operation on the ground at high RPM should be avoided as far as possible, as the blades could suffer stone damage. For this reason a suitable site for engine runs should be selected, where there are no loose stones or similar items.

**WARNING**

Never move the propeller by hand.

### 7.9.3 OPERATING CONTROLS

#### Power Lever

Engine performance is controlled by a power lever for each engine. Both power levers are situated on the large center console. 'Front' and 'rear' are defined in relation to the direction of flight.

Each power lever is used to set the desired engine power LOAD (%)

Lever forward (MAX) = Full power

Lever to rear (IDLE) = Idle

A separate ECU for each engine controls manifold pressure, injected fuel quantity and propeller speed according to the desired engine power preselected with the power lever. If the power lever is in a low power position - as for a landing approach - while the landing gear is retracted, an aural warning alerts the pilot to the retracted landing gear. Additionally, a CHECK GEAR caution is indicated on the PFD.

A propeller governor, which is controlled by the ECU, is flanged onto the front of each engine. The propeller governor oil circuit is supplied with oil by the gearbox oil pump (also see Section 7.9.2 - PROPELLER). A loss of oil pressure leads to a feathering of the propeller blades, thus allowing continuation of the flight according to 3.11.3 - DEFECTIVE PROPELLER RPM REGULATING SYSTEM.

### **CAUTION**

Following governor failure the RPM should be adjusted using the power lever. Every effort should be made not to exceed 2300 RPM.

### CAUTION

The power lever should be moved slowly, in order to avoid over-speeding and excessively rapid RPM changes. The light wooden propeller blades produce more rapid RPM changes than metal blades.

### WARNING

It is possible that the propeller blades remain in the position of highest pitch in case of a malfunction of the engine control unit. In this case the reduced engine performance should be taken into consideration.

### ELECT. MASTER

The ELECT. MASTER switch has two positions:

OFF disconnecting battery power

ON connecting battery power to the power distribution system

### ENGINE MASTER

Each engine can only be cranked with its ENGINE MASTER switched to ON. When activated, the ENGINE MASTER provides the power supply for the preheat system, the unfeathering accumulator valve and the engine itself. To shut down the engine the appropriate ENGINE MASTER is switched to OFF.

### START

Turning START key switch to the left starts the LH engine. Turning it to the right side starts the RH engine.

There are two VOTER switches, one for each engine. For normal operation both switches are set to AUTO. Each engine is controlled by either ECU A or ECU B. In case of a failure of the active electrical engine control unit (ECU) there should be an automatic switch-over to the other ECU. If the automatic switch over fails, switch over can be done manually by switching to ECU A or ECU B. This procedure should only be applied in an emergency.

### ECU TEST

There are two ECU TEST buttons, one for each engine. Depending on the position of the power lever and the engine speed, the ECU TEST button has two different functions.

#### *Power Lever at IDLE and RPM Below Approximately 900:*

By pushing and holding the button until the end of the procedure, the self-test of each engine control unit is started. The procedure is possible on the ground only. Otherwise the test will not start. During the procedure the ECU performs a switch from ECU A to ECU B or ECU B to ECU A, whichever is active at the moment, with the propeller cycling. The propeller RPM is monitored automatically by the ECU. When switching from one ECU to the other, a slight shake of the engine may occur. Finally the ECU switches back from ECU B to ECU A. After that both caution lights must extinguish and the engine must run without a change.

Alternate Air

In the event of power loss because of icing or blocking of the air filter, there is the possibility of drawing air from the engine compartment. The ALTERNATE AIR operating lever which serves both engines simultaneously is located under the instrument panel to the right of the center console. To open the alternate air source the lever is pulled to the rear. Normally, the alternate air source is closed with the lever in the forward position.

Placard on the lever, forward position:

<b>ALTERNATE AIR</b>
----------------------

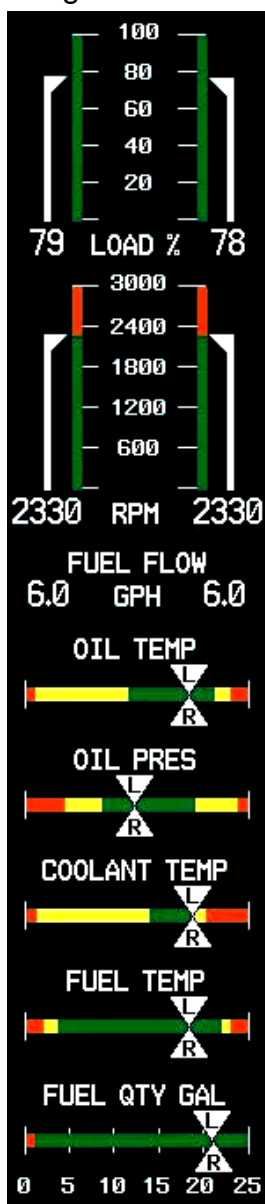
Placard on the lever, visible when lever is in the rearward position:

<b>ALTERNATE AIR</b> <b>ON</b>
-----------------------------------

### 7.9.4 ENGINE INSTRUMENTS

The engine instruments are displayed on the Garmin G1000 MFD. Also refer to Section 7.13.3 - MULTI FUNCTION DISPLAY (MFD). Indications for the LH engine are on the left side, indications for the RH engine are on the right side.

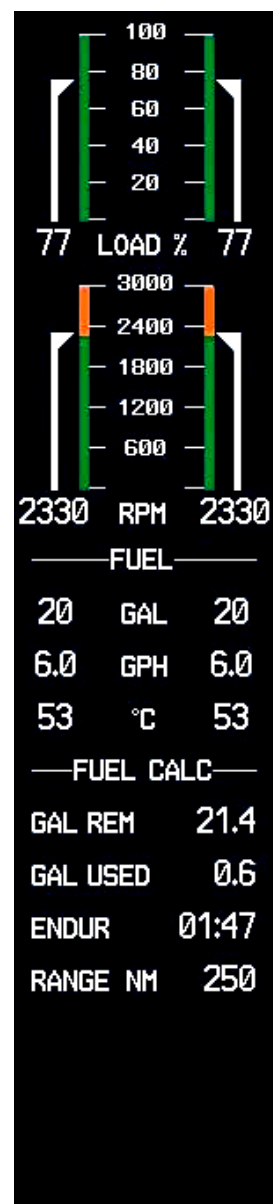
Default page  
Engine



Display when pushing  
the SYSTEM button



Display when pushing  
the FUEL button



**NOTE**

The figure on previous page is a general demonstration of a typical G1000 MFD to show the different display modes. The pictured engine instrument markings may not stringently agree with the current engine limitations of the DA 42 NG.

**NOTE**

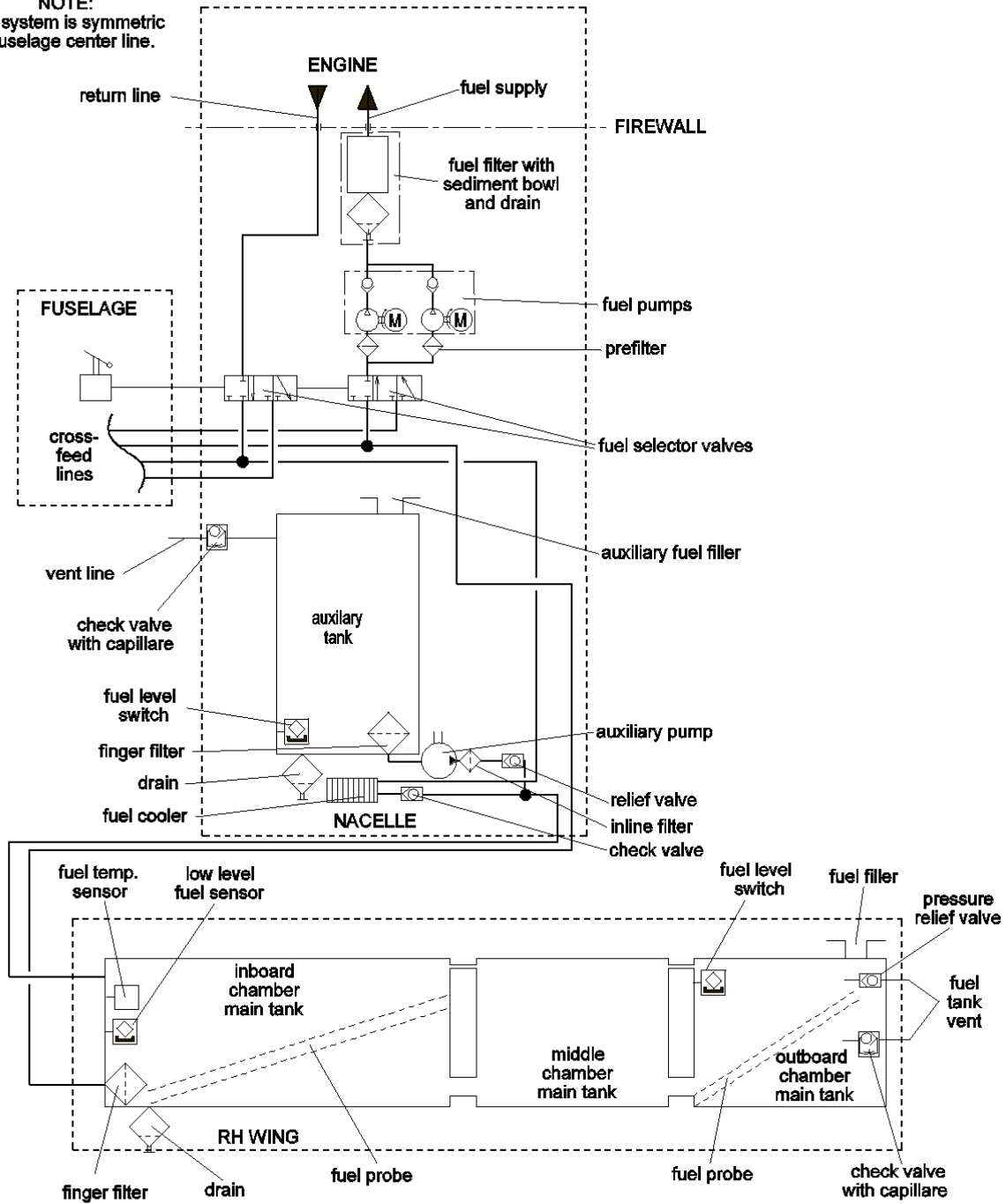
The fuel calculations on the FUEL CALC portion do not use the airplane's fuel quantity indicators. The values shown are numbers which are calculated from the last fuel quantity update done by the pilot and actual fuel flow data. Therefore, the endurance and range data is for information only, and must not be used for flight planning.

Designation	Indication	Unit
LOAD %	Available power	%
RPM	Propeller RPM	1/min
VOLTS	Volts	V
AMPS	Ampères	A
COOLANT TEMP	Coolant temperature	°C
GEARBOX	Gearbox temperature	°C
OIL TEMP	Engine oil temperature	°C
OIL PRES	Oil pressure	bar
FUEL QTY GAL	Fuel quantity	US gal
FUEL FLOW	Fuel flow	US gal/hr
FUEL TEMP	Fuel temperature	°C

### 7.9.5 FUEL SYSTEM

#### General

NOTE:  
Fuel system is symmetric  
to fuselage center line.





Fuel is stored in the tanks which are located in the wings.

Normally fuel for the right engine is taken from the right wing main tank and for the left engine from the left wing main tank.

On each engine fuel is injected with high pressure directly into the cylinders. The injection nozzles (one per cylinder) are supplied with fuel by the common rail. Pressure inside the rail is generated by a high pressure pump which receives fuel from two independent low pressure fuel pumps. Both pumps are powered electrically. Depending on the power setting the rail pressure is controlled by the ECU through an electric valve. Fuel that is not injected is fed back into the appropriate wing tank.

Both sides of the fuel system are interconnected by crossfeed lines.

In each engine nacelle an auxiliary fuel tank may be installed.

### Fuel Pumps

Each engine is feed by two parallel installed independent low pressure fuel pumps. During normal operation one of the two fuel pumps is working. In case of a low fuel pressure failure the ECU switches automatically to the second fuel pump. During landing and take-off, or in case of a fuel pressure failure both fuel pumps can be activated by the FUEL PUMP switch. If both fuel pumps are activated the fuel pressure increases.

### **WARNING**

Switching on the fuel pump in combination with CROSSFEED may cause damage to the high-pressure pump due to the high fuel pressure. After switching on the fuel pump in combination with CROSSFEED in case of an emergency special maintenance of the high pressure pump is required.

Each fuel pump is electrically connected to the LH/RH ECU BUS and protected by a 7.5 A circuit breaker.

**NOTE**

By switching between ECU A and B the two independent electrical fuel pumps are switched over as well. In case of an emergency both pumps can be activated simultaneously by using the fuel pump switch.

Fuel Selector Valves

For each engine one fuel selector valve is provided. The control levers for the fuel selector valves are situated on the center console behind the power levers. The positions are ON, CROSSFEED and OFF. During normal operation each engine takes the fuel from the tank on the same side as the engine. Before crossfeed operation check fuel pump is OFF. When CROSSFEED is selected, the engine will draw fuel from the tank on the opposite side in order to extend range and keep fuel weight balanced during single engine operation. With the fuel selector valve both the feeding and the return line are switched.

The desired position is reached by pulling the lever back. To reach the OFF position a safety guard must be twisted. This is to ensure that this selection is not made unintentionally.

**NOTE**

If one engine is inoperative the fuel selector valve for this engine must be in the OFF position.

**CAUTION**

Do not operate with both fuel selector valves in crossfeed position. Do not take-off with a fuel selector valve in crossfeed position.

**CAUTION**

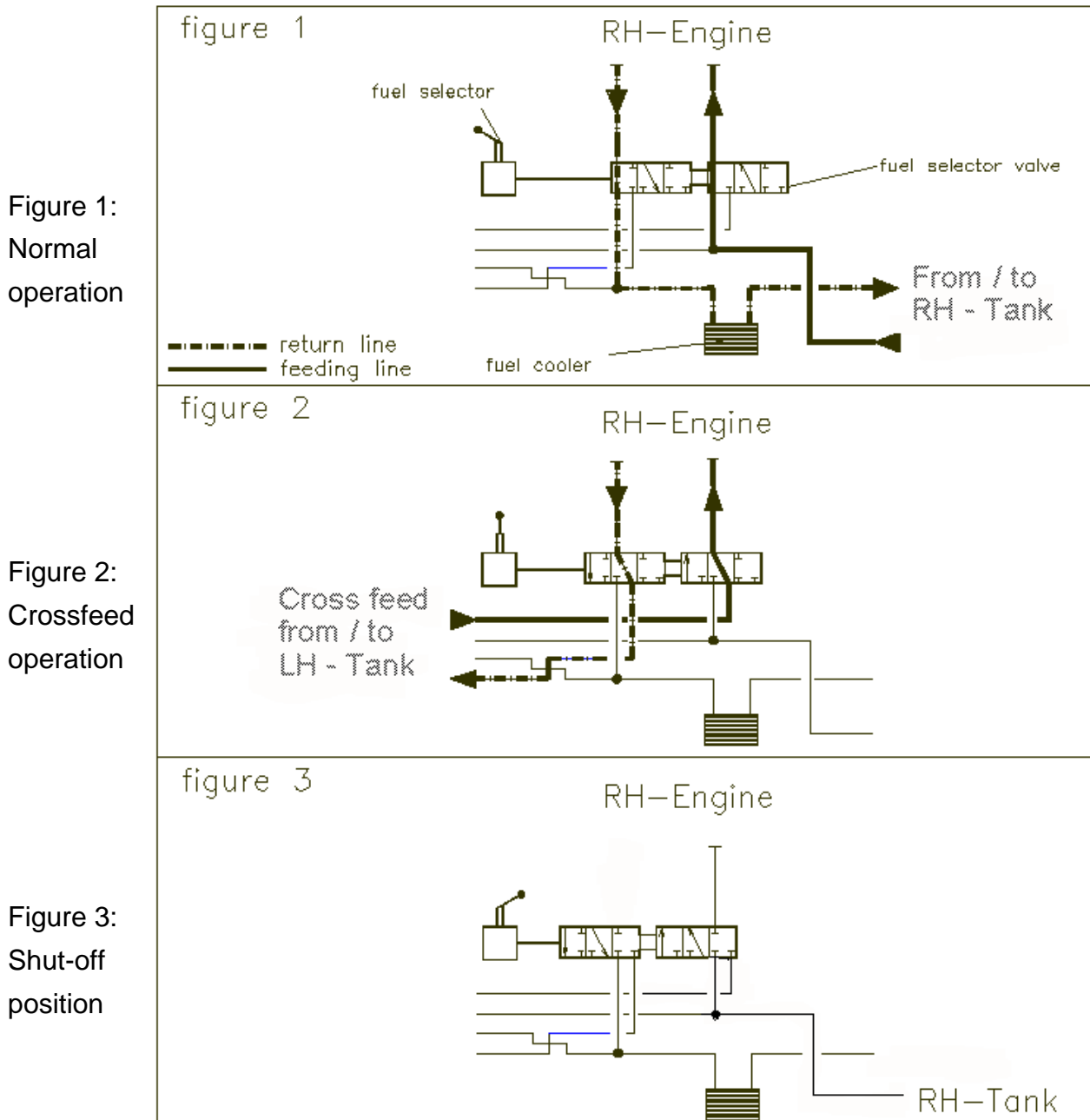
Do not shut down an engine with the fuel selector valve. The high pressure fuel pump can be damaged.

**CAUTION**

Switching on the fuel pump in combination with CROSSFEED may cause damage to the high-pressure pump.

*Scheme of the Fuel Selector Valve Positions:*

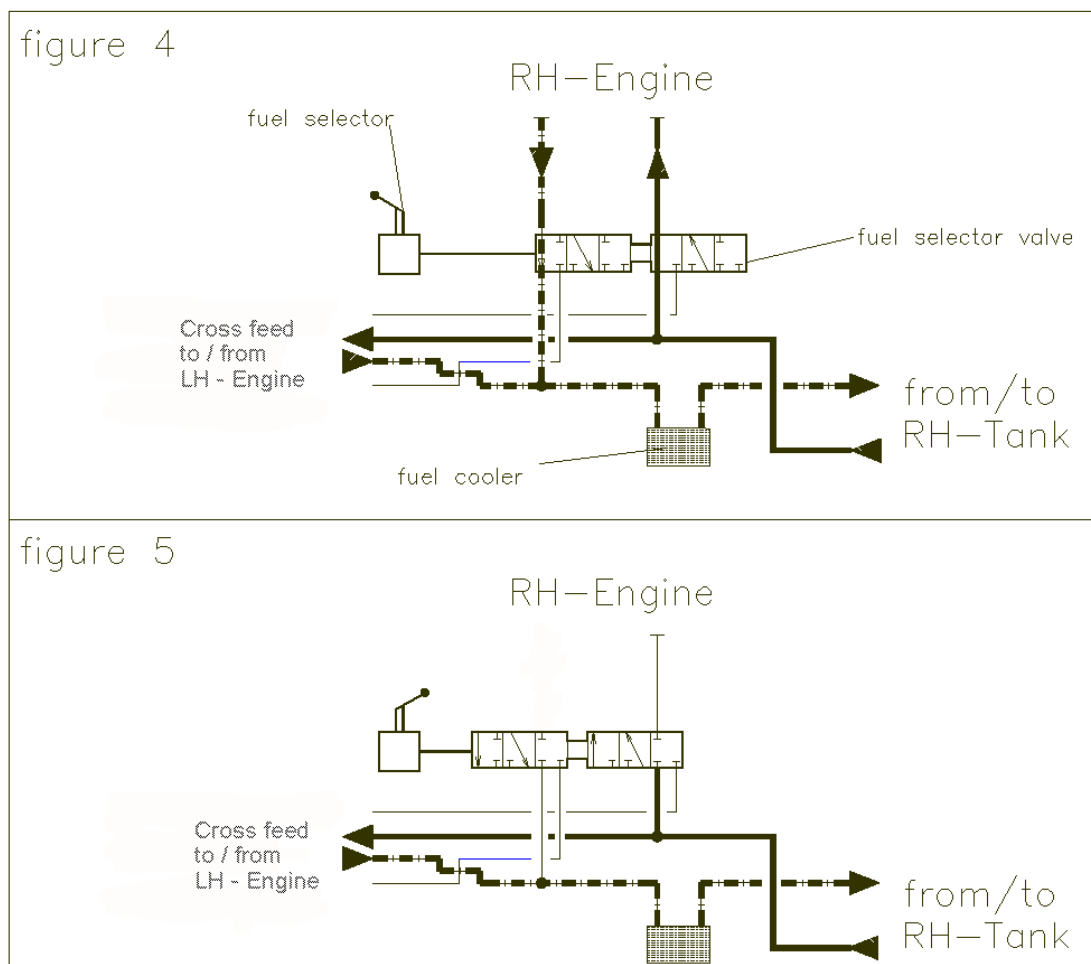
Possible operating modes of the three fuel selector valve positions are outlined systematically in the following scheme. The figures below show fuel flows for the RH engine (fuel flows LH are alike):



With the LH fuel selector valve in crossfeed position, the fuel from the RH tank is transferred to the LH engine. Depending on the position of the RH fuel selector valve, the RH tank then feeds both engines (as shown in figure 4 below) or only the LH engine, when the fuel selector valve of the RH engine is in shut-off position (as shown in figure 5 below).

Figure 4: Fuel selector valve RH normal operation position, fuel selector valve LH crossfeed position

Figure 5: Fuel selector RH valve shut-off position, fuel selector valve LH crossfeed position



### Main Fuel Tanks

Each tank consists of three aluminum chambers which are connected by a flexible hose. The tank is filled through a filler in the outboard fuel chamber. Only four liters (1 US gal) of fuel in each wing are unusable, so that a total quantity of 96 liters (25.4 US gal) in each wing is usable.

There are two tank vents. One includes a check valve with a capillary and one includes a relief pressure valve, which operates at 150 mbar (2 psi) and allows fuel and air to flow to the outside with higher internal pressure. The relief pressure valve protects the tank against high pressure, if the tank was overfilled in case of an auxiliary fuel transfer failure. The check valve with capillary allows air to enter the tank but prevents flow of fuel to the outside. The capillary equalizes the air pressure during climb. The hose terminals are located on the underside of the wing, approximately 2 meters (7 ft) from the wing tip.

In each tank a coarse filter (finger filter) is fitted before the outlet. To allow draining of the tank, there is an outlet valve at its lowest point.

At the lowest point in each side of the fuel system a fuel filter with a drain valve is installed. This drain valve can be used to remove water and sediment which has collected in the fuel system. The drain valves are fitted in each nacelle behind the firewall, approximately 15 cm (0.56 ft) backward of the wing leading edge.

### *Fuel Quantity Indication*

Two capacity probes measure the fuel quantity in each main tank. The indication is provided by the G1000 flight display. Information about fuel consumption can be found in Chapter 5 - PERFORMANCE.

### Auxiliary Fuel Tanks (if installed)

The auxiliary fuel tanks are optional equipment (OÄM 42-056).

#### *Description*

The auxiliary fuel tanks are installed in the rear section of the engine nacelles, above the wing main spars. Each auxiliary fuel tank has a filler cap located on the top surface of the nacelle. The additional fuel capacity is 13.7 US gallons (52 liters) per side. The total fuel capacity (main fuel tanks and auxiliary fuel tanks) is 39.7 US gallons (150.4 liters) per side.

The fuel supply connection attaches to a finger filter mounted at the rear of the auxiliary fuel tank. Each auxiliary fuel tank has a auxiliary pump which transfers fuel into the related main fuel tank.

The vent line for the auxiliary fuel tank has a check valve with capillary. It allows air to enter the tank but prevents flow of fuel to the outside. The capillary equalizes the air pressure during climb. A fuel drain valve is located at the rear of each auxiliary tank.

#### *Operation*

Two AUX PUMP switches in the cockpit are used to activate the auxiliary pumps. The switches are located behind the elevator trim wheel on the center console. Both switches are intended to be used simultaneously to prevent the airplane from additional lateral imbalance. The auxiliary pump transfers the fuel from the auxiliary fuel tank into the related main fuel tank. Fuel level switches shut off this pump automatically when the auxiliary fuel tank is empty or when the main fuel tank is full. During operation of the pumps an advisory alert on the Garmin G1000 indicates that the fuel transfer is in progress.

If the auxiliary fuel tank is empty, a caution alert appears on the Garmin G1000. In this case the auxiliary pumps must be switched OFF.

When one auxiliary pump is defective, the fuel stored in the related auxiliary fuel tank is not available. For use of the remaining fuel pump refer to Section 4B.12 - L/R FUEL TRANSFER FAIL. The flight plan must be amended accordingly.

The auxiliary pumps are electrically connected to the LH MAIN BUS and protected by a 5A circuit breaker, if no ice protection system (OÄM 42-053) is installed.

If the ice protection system is installed, both systems are protected by a 10 A circuit breaker and an additional 7A fuse for the auxiliary pumps. The circuit breaker is labeled XFER PUMP/DE ICE.

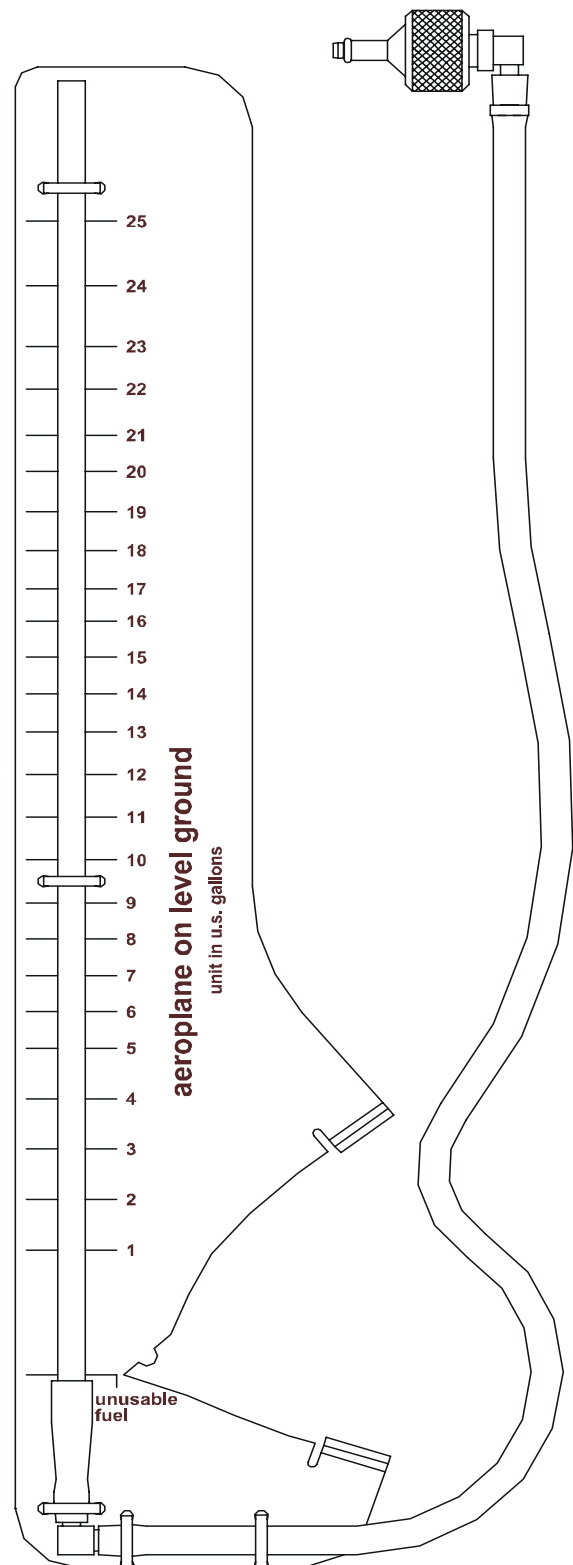


*Alternate Means for Fuel Quantity  
Indication for the Fuel Tank:*

The alternate means for fuel quantity indication allows the fuel quantity in the tank to be determined during the preflight inspection. It functions according to the principle of communicating containers. The fuel quantity measuring device has a recess which fits the airfoil of the wing in front of the fuel tank drain, which lies approximately 10 cm (4 in) outboard of the engine nacelle. The metal connector is pressed against the drain of the tank. The amount of fuel in the tank can now be read off from the vertical ascending pipe.

For an exact indication the airplane must stand on level ground and the measuring device must be held vertically.

The designated location for the fuel quantity measuring device is a bag on the rear side of the pilot seat.



Fuel Temperature

Max. fuel temperature: 60 °C (140 °F)

Fuel Grade

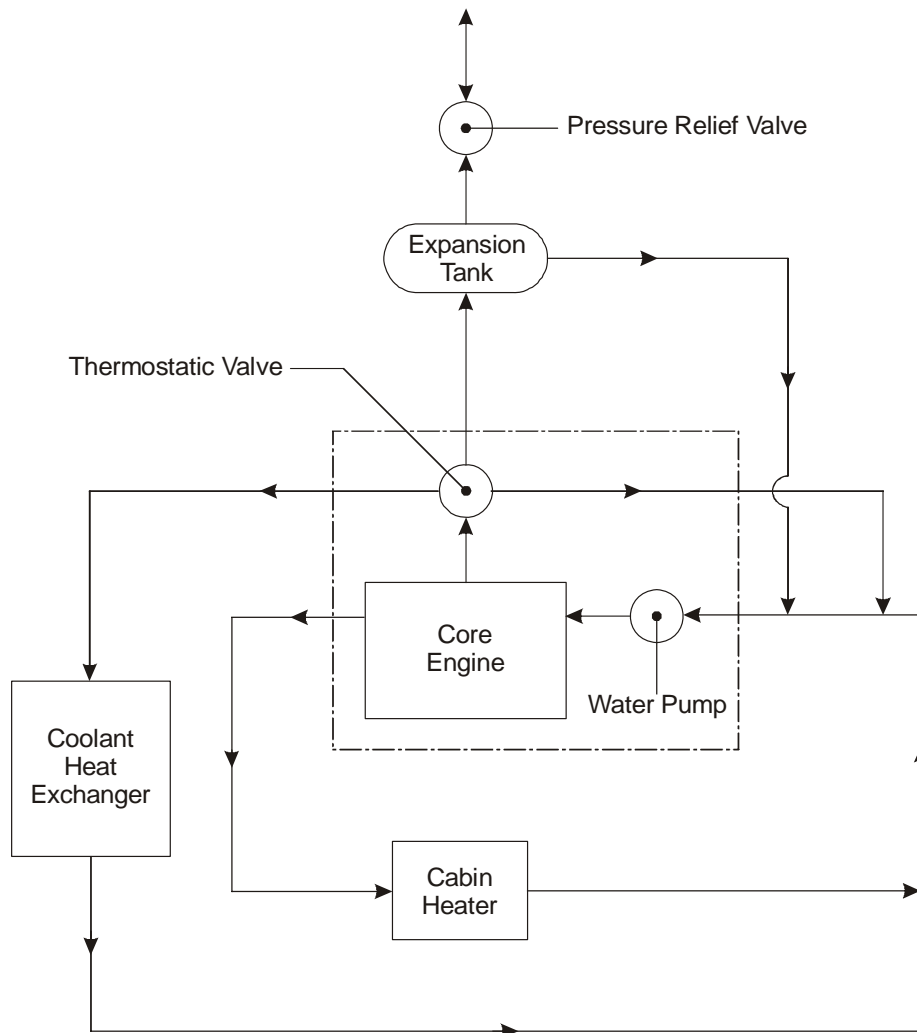
Approved fuel grades are listed in Section 2.14 - FUEL.

**NOTE**

In order to provide information about the fuel grade it is recommended to enter the fuel grade in the airplane log each time fuel is refilled.

### 7.9.6 COOLING SYSTEM

Each engine is liquid cooled. The liquid cooling system consists of a radiator (coolant heat exchange) and a bypass to this radiator. The bypass is in operation when coolant temperatures are low. It therefore allows the engine to warm-up quickly. Upon reaching a certain temperature (approximately 88 °C or 190 °F) the radiator is activated by a thermostatic valve. Additionally a coolant to air heat exchanger is provided for the cabin heat system. The flow through the heat exchanger is independent of the coolant temperature. An expansion tank helps to adjust the pressure in the system. The system is protected against overpressure by means of a pressure relief valve.



### **7.9.7 OIL SYSTEMS**

Each engine has two separate oil systems.

#### Lubrication System (Engine and Turbo-Charger)

The engine lubrication is a wet sump lubrication system. The oil is cooled by a water/oil-cooler on the upperside of the engine.

A dip-stick is provided to check the oil quantity through an inspection hole in the left cowling. If required, oil can also be filled in there (for approved oil grades refer to Section 2.4 - POWER-PLANT LIMITATIONS).

#### Gearbox and Propeller Governor System

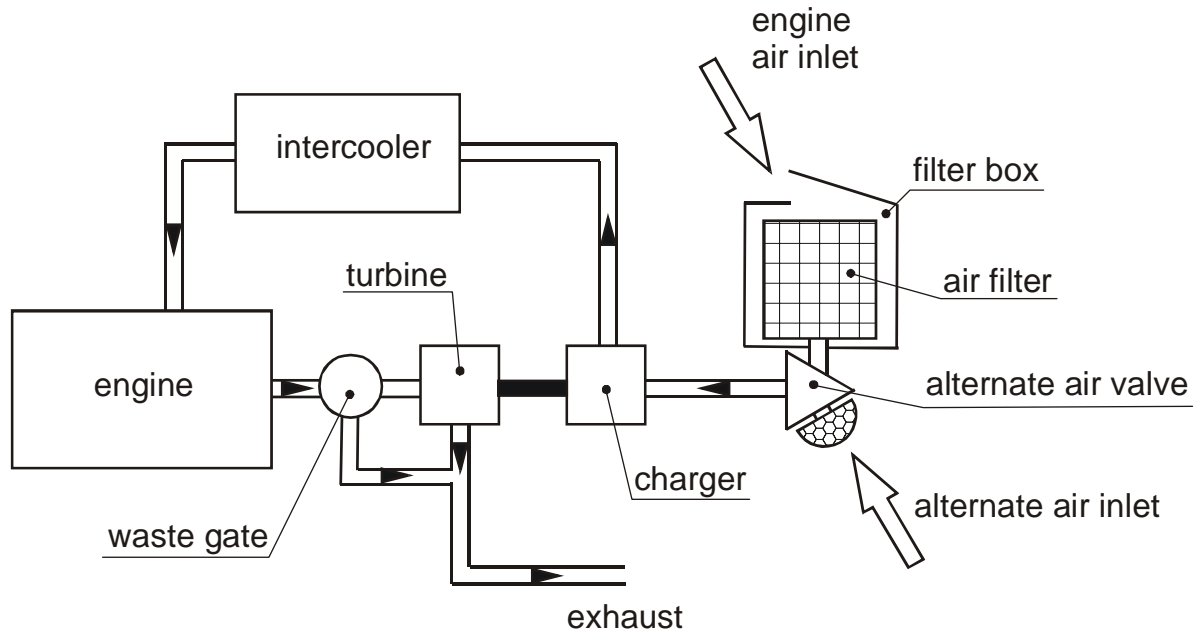
The second oil circuit lubricates the gearbox and serves the governor system and the regulation of the propeller.

The gearbox oil quantity can be checked with the help of an inspection glass which can be reached through an inspection hole on the left side of the cowling.

### **CAUTION**

If the gearbox oil quantity is too low, an unscheduled maintenance is necessary (for approved oil grades refer to Section 2.4 - POWER-PLANT LIMITATIONS).

### 7.9.8 TURBO-CHARGER SYSTEM



The exhaust system contains a manifold which collects exhaust gases from the outlets of the cylinders and feeds them to the turbine of the turbo charger. Behind the turbine the exhaust gases are guided through the lower cowling to the exterior of the airplane. Excess exhaust gases bypass the turbine. The bypass is controlled by the ECU through the waste gate valve. A manifold pressure sensor behind the compressor allows the ECU to calculate the correct position of the waste gate valve. This prevents excessive manifold pressures at low density altitudes. The intake air is compressed in the compressor which is driven by the turbine, and is subsequently cooled down in the intercooler to increase power. Cooling the air increases efficiency through the higher density of the cooler air.

### **7.9.9 FIRE DETECTION SYSTEM**

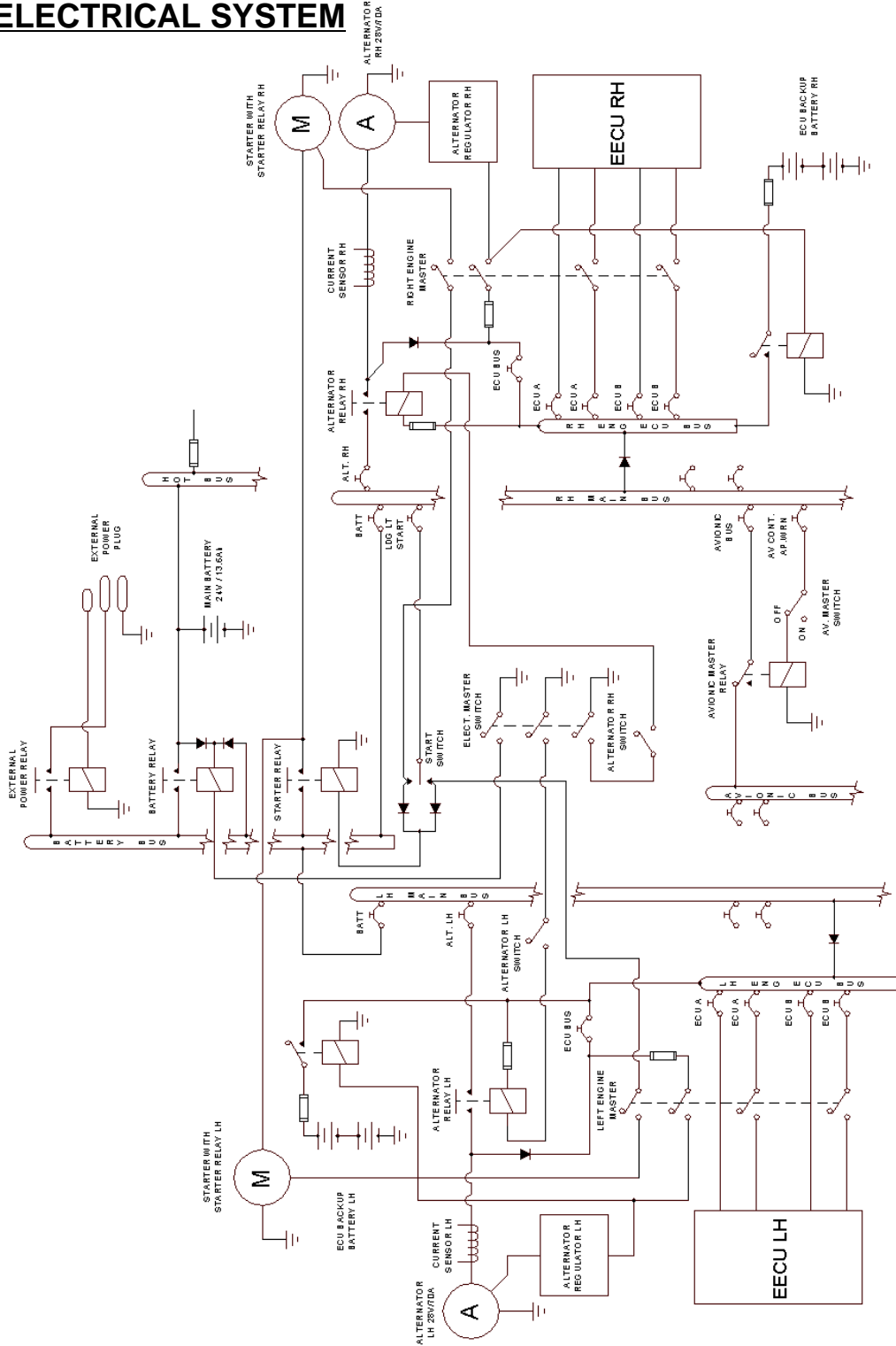
The fire detection system in the DA 42 NG consists of an overheat detector in the hot area of each engine. In case of an increase of the engine compartment temperature above 250 °C (480 °F) the overheat detector closes the electric circuit and a warning message appears in the annunciation window of the G1000 PFD.

To test the fire detectors (refer to Section 4A.6.1 - PREFLIGHT INSPECTION) push the test button located next to the gear selector switch. An aural alert and the fire warning message for the LH and RH engine should appear in the annunciation window of the G1000 PFD.

#### **CAUTION**

If the aural alert or the warning does not appear, an unscheduled maintenance is necessary.

**7.10 ELECTRICAL SYSTEM**



### 7.10.1 GENERAL

The DA 42 NG has 28 Volt DC system, which can be sub-divided into:

- Power generation
- Storage
- Distribution
- Consumers

#### Power Generation

Power generation is provided by two 70 Ampère alternators (generators) which are mounted on the bottom left side of each engine. The alternators are driven by a flat belt.

The power output line of the left hand alternator is connected to the LH MAIN BUS via the LH alternator relay and a 60 Ampère circuit breaker. The power output line of the RH alternator is connected to the RH MAIN BUS via the RH alternator relay and a 60 Ampère circuit breaker. Both main busses are connected to the BATTERY BUS via a 90 Ampère circuit breaker.

Both generator power output lines also run through a current sensor for each alternator, which provides an indication of the power being supplied to the electrical system by an alternator including the current for battery charging on the G1000. In the event of a main battery failure the field of each alternator is energized by two 12 V, 7.2 Ah sealed lead acid batteries (ECU backup battery) connected in series, which are installed under the passengers' seats. The ECU backup batteries provide also electrical power for the ECU for a time of 30 minutes (condition).

The ENGINE MASTER LH (RH) switches connect the ECU backup battery to the alternator field via a 10 Ampère fuse.



### *Alternator Control:*

Each alternator has an alternator control unit. It measures the alternator output voltage and controls the current through the alternator field coils via a pulse-width modulated signal. To keep the output voltage stable in all load and speed situations, the alternator field signal is modulated accordingly.

The alternator control unit includes a comprehensive set of diagnostic functions that will warn the operator using a caution message (L/R ALTN FAIL) on the G1000 PFD in case of over- or undervoltage as well as a couple of other internal warning levels.

### Storage

Main battery power is stored in a 24 V, 13.6 Ah lead-acid battery mounted on the right-aft side of the front baggage compartment. The main battery is connected to the HOT BATTERY BUS and to the BATTERY BUS via the 'battery'-relay which is installed in the relay junction box on the center-aft side of the front baggage compartment.

The battery relay is controlled with the ELECT. MASTER switch which is located on the left-hand side of the instrument panel.

In addition, a non-rechargeable dry battery is installed as a further source of power for the backup attitude gyro (artificial horizon) and the flood light. When the EMERGENCY switch is set to ON, these two systems are supplied with power for at least 1.5 hours, independent of all other electrical consumers. During each 100 hour inspection, this battery is checked for proper functioning. Every 2 years or after use (broken seal on the switch) the battery package must be replaced.

Distribution

Electrical power is distributed via the HOT BATTERY BUS, the BATTERY BUS, the LH (RH) ECU BUS, the LH (RH) MAIN BUS, and the AVIONIC BUS.

*HOT BATTERY BUS:*

The HOT BATTERY BUS is directly connected to the main battery and cannot be disconnected from the main battery. The HOT BATTERY BUS provides power to the pilot map/reading light and ELT RCPI unit which are protected by their own fuses.

*BATTERY BUS:*

The BATTERY BUS is connected to the main battery via the battery relay which can be controlled by the ELECT. MASTER switch. The BATTERY BUS provides power to the LH (RH) MAIN BUS and heavy duty power to both starters.

*ECU BUS:*

The LH (RH) ECU BUS is connected to the LH (RH) MAIN BUS via a diode and connected to the power output line of the alternator via diode and a 30 Ampère circuit breaker and provides power for the ECU A and ECU B via the LH (RH) ECU A (B) relays which are controlled by the LH (RH) ENGINE MASTER switch. The LH (RH) ENGINE MASTER switch must be set to ON to connect the ECU A and ECU B to the ECU BUS.

To support the alternator electrical power supply to the ECU's in case of a malfunction of the main battery, additional sealed-lead-acid batteries (ECU backup battery) are connected to the RH and LH ECU bus.

These batteries are able to provide 30 minutes of engine operation in case of a complete airplane electrical failure. Both engines may stop if the 30 minutes have elapsed.

### *MAIN BUS:*

The LH (RH) MAIN BUS is connected to the BATTERY BUS via a 90 Ampère circuit breaker. The LH MAIN BUS provides power to the consumers directly connected to the LH MAIN BUS. The RH MAIN BUS provides power to the consumers directly connected to the RH MAIN BUS and the AVIONIC BUS via the avionics master relay.

The AVIONIC MASTER switch must be set to ON to connect the RH MAIN BUS to the AVIONIC BUS.

### Consumers

The individual consumers (e.g. radio, position lights, etc.) are connected to the appropriate bus via automatic circuit breakers.

Designations and abbreviations used to identify the circuit breakers are explained in Section 1.5 - DEFINITIONS AND ABBREVIATIONS.

### Voltmeter

The voltmeter displays the voltage of the electrical system. Under normal operating conditions the alternator voltage is shown, otherwise it displays the main battery voltage.

### Ammeter

The ammeter displays the intensity of current which is supplied to the electrical system by the LH (RH) alternator.

### Landing and Taxi Lights

Landing and taxi lights are built into the wing center section, and are each operated by means of a switch (LANDING, TAXI) located on the row of switches on the instrument panel.

### Position and Strobe Lights

Combined position and strobe lights (anti collision lights) are installed on both wing tips. Each system is operated by a switch (POSITION, STROBE) located on the row of switches on the instrument panel.

### Flood Light

A two-dimensional light emitter is mounted above the instrument panel. It illuminates the instrument panel as well as all levers, switches, etc. The flood light is switched on and its brightness is adjusted by means of a rotary button (FLOOD) in the LH section of the instrument panel.

### Instrument Lighting

With a rotary button (INSTRUMENT) in the LH section of the instrument panel the internal lighting of the instruments is switched on and its brightness is adjusted.

### Pitot Heating

The Pitot probe, which provides measurement for the Pitot-static system, is electrically heated. The heating is activated with a switch (PITOT HEAT) located on the row of switches on the instrument panel. The temperature is automatically kept constant by means of a thermal switch on the Pitot probe, and as an additional safety measure a thermal fuse is built in. If this thermal fuse is activated, the Pitot heating can no longer be switched on, and the PITOT FAIL will be displayed. In this case the system should be serviced. The PITOT HT OFF is on if the Pitot heating is switched off.

### External Power Socket

The DA 42 NG has an external 28 Volt DC power socket located on the lower surface of the fuselage nose section. When external power is connected, the control relay is energized and the external power comes online.

The socket itself has three pins:

- a large negative pin
- a large positive pin
- a small positive pin

A diode protects the system from reverse polarity.

## 7.10.2 ELECTRICAL ENGINE CONTROL UNIT / ECU

### Engine Control and Regulation

The Electrical ECU is used to control the engine actuators (e.g. fuel injectors) according to the engine sensor information. The ECU monitors, controls and regulates all important parameters for engine operation.

Sensors installed are:

- Oil temperature (lubrication system engine) / OIL TEMP
- Oil pressure (lubrication system engine) / OIL PRES
- Coolant temperature / COOLANT TEMP
- Gearbox temperature / GEARBOX
- Camshaft RPM (twice)
- Crankshaft RPM (twice)
- Fuel pressure in the common rail
- Manifold pressure
- Manifold air temperature
- Ambient air pressure
- Propeller governor / oil pressure
- Power lever position (twice)
- Voltage
- Starter switch signal
- Fuel pressure
- VOTER switch signal
- ECU TEST switch signal

In accordance with the received signals and a comparison with the programmed characteristic diagrams the necessary inputs are calculated and transmitted by the following signal lines to the engine:

- Signal for propeller governor pressure valve
- Signal for the rail-pressure regulation valve
- Signal for each of the 4 injection nozzles
- Activation of the glow plugs
- Signal for the waste gate valve

The following alerts are displayed on PFD of the G1000:

- Glow sparks active
- Status ECU A
- Status ECU B

The Electrical ECU consists of two similar ECUs. A VOTER switch is integrated in the Electrical ECU and proposes an ECU to control the engine regarding the ECU operating hours or in case of a failure the ECU with better engine control capability.

A fault in one of the ECUs is indicated by a caution message on the PFD (L/R ECU A/B FAIL). After the indication of the L/R ECU A/B FAIL caution message, the engine must be serviced.

### **7.10.3 WARNING, CAUTION AND ADVISORY MESSAGES**

#### Crew Alerting System (CAS)

The G1000 crew alerting system (CAS) is designed to provide visual and aural alerts to the flight crew. Alerts are divided into three levels as follows:

**WARNING**

**CAUTION**

**ADVISORY**

Crew alerts will appear in the alerts window on the PFD. In this window warnings will appear at the top, followed by cautions and advisories, respectively. Within the criticality levels, messages will appear from newest (top) to oldest (bottom).

At the low right corner of the display there is a MSG (message) soft key. The MSG key provides two functions in the CAS:

1. Pressing the MSG key acknowledges a new master warning / caution / advisory indication.
2. An additional MSG key press with no master alert indication active will open a pop-up auxiliary flight display (AFD) page that contains information for all active alerts.

This structure allows the crew to scroll through all system alerts if the alerts window overflows. This approach displays the most critical alerts close to the pilot's primary field of view at all times, with the option of allowing lower criticality alerts to overflow and be accessible from the pop-up AFD page/window.



Alert Levels

Level	Text Color	Importance	Audible Tone
Warning	Red	May require immediate corrective action	Warning chime tone which repeats without delay until acknowledged by the crew
Caution	Amber	May require future corrective action	Single warning chime tone
Annunciation Advisory	White		None
Message Advisory	White		None
Safe Operation Annunciation	Green	Lowest	None

Warning Alerts on the G1000

Warning alerts	Meaning / Cause
L/R ENG TEMP	The annunciation is active when the engine coolant temperature is greater than 105 °C.
L/R OIL TEMP	The annunciation is active when the engine oil temperature is greater than 140 °C.
L/R OIL PRES	The annunciation is active when the engine oil pressure is less than 1.5 bar.
L/R FUEL TEMP	The annunciation is active when the fuel temperature is greater than 60 °C.
L/R GBOX TEMP	The annunciation is active when the gearbox oil temperature is greater than 120 °C.
L/R FUEL PRES	The annunciation is active when the engine fuel pressure is low.
L/R ALTN AMPS	The annunciation is active when the alternator load is greater than 70 amps.
L/R ENG FIRE	The annunciation is active when an engine fire is detected.
L/R STARTER	This annunciation is used to indicate to the pilot that the starter is engaged when it should not be.
DOOR OPEN	The annunciation is used to indicate to the pilot if the baggage-, canopy- or rear door is open.
POSN ERROR	The annunciation is active when the G1000 will no longer provide GPS based navigational guidance.
ATTITUDE FAIL	The annunciation is active when the display system is not receiving attitude reference information from the AHRS.
AIRSPEED FAIL	The annunciation is active when the display system is not receiving airspeed input from the air data computer.
ALTITUDE FAIL	The annunciation is active when the display system is not receiving altitude input from the air data computer.

Warning alerts	Meaning / Cause
VERT SPEED FAIL	The annunciation is active when the display system is not receiving vertical speed input from the air data computer.
HDG	The annunciation is active when the display system is not receiving valid heading input from the AHRS.
WARN	This annunciation constitutes a RAIM position warning. The nav deviation bar is removed.

#### Audible Warning Alerts

Warning alerts	Meaning / Cause
Landing gear retracted	A warning chime tone which repeats without delay is active when the landing gear is retracted while the flaps move into the LDG position or when the POWER lever is placed in a position below 25 %.

Caution Alerts on the G1000

Caution alerts	Meaning / Cause
L/R ECU A FAIL or L/R ECU B FAIL	The annunciation is active when a fault in ECU A or ECU B has occurred.  In case of minor faults, the annunciation can be reset once by pressing the ECU TEST button for more than 2 seconds. However, the annunciation will re-appear upon the next attempt to start the engine.
L/R FUEL LOW	The annunciation is active when the fuel quantity is below 4 ± 1 US gal usable fuel.
L/R VOLTS LOW	The annunciation is active when bus voltage is less than 25 Volts.
L/R ALTN FAIL	The annunciation is active when the alternator has failed.
L/R COOL LVL	The annunciation is active when engine coolant level is low.
PITOT FAIL	The annunciation is active when the Pitot heater is failed.
PITOT HT OFF	The annunciation is active when the Pitot heat is off.
STAL HT FAIL	The annunciation is active when the stall heater is failed.
STAL HT OFF	The annunciation is active when the stall heater is off.
STICK LIMIT	Control stick limiting system (variable elevator stop) has failed.
L/R AUX FUEL E	This annunciation can only occur when the auxiliary fuel tank system (optional equipment) is installed.  The annunciation is active when the L/R auxiliary fuel tank is empty and the AUX PUMP is ON.
INTEG RAIM not available	The annunciation is active when RAIM (Receiver Autonomous Integrity Monitor) is not available.
AHRS ALIGN: Keep Wings Level	The annunciation is active when the AHRS (Attitude and Heading Reference System) is aligning.
CHECK GEAR	Landing gear is not down and locked.

Caution alerts	Meaning / Cause
DEICE LVL LO	De-icing fluid level is low (if installed).
DEICE PRES HI	De-icing pressure is high (if installed).
DEICE PRES LO	De-icing pressure is low (if installed).

Annunciation Advisory Alerts on the G1000

Advisory alerts	Meaning / Cause
L/R GLOW ON	The annunciation is active when the glow plugs are powered.
L/R AUXPUMP ON	The annunciation is active when fuel transfer from auxiliary to main tank is in progress (if installed).

Message Advisory Alerts on the G1000

Advisory alerts	Meaning / Cause
PFD FAN FAIL	The annunciation is active when the PFD fan is inoperative.
MFD FAN FAIL	The annunciation is active when the MFD fan is inoperative.
GIA FAN FAIL	The annunciation is active when the GIA fan is inoperative.

## **7.11 PITOT-STATIC SYSTEM**

Total pressure is measured at the leading edge of a Pitot probe under the left wing. The static pressure is measured through the static ports in the rear fuselage. To protect against dirt and condensation there are filters in the system. The Pitot probe is electrically heated.

With the alternate static valve, the static pressure in the cabin can be used as static pressure source in the event of a failure of the Pitot-static system.

## **7.12 STALL WARNING SYSTEM**

The lift detector of the DA 42 NG is located on the front edge of the left wing below the wing chord line. It is supplied electrically and provides a stall warning, before the angle of attack becomes critical. The stall status is announced to the pilot by a continuous sound in the cockpit.

The lift detector vane, the mounting plate and the complete housing are heated to prevent icing. Heating is engaged together with the Pitot heating.

## **7.13 GARMIN G1000 INTEGRATED AVIONICS SYSTEM**

### **7.13.1 GENERAL**

The Gamin G1000 is a fully integrated flight, engine, communication, navigation and surveillance instrumentation system. This integrated avionics system consists of a primary flight display (PFD), a multi-function display (MFD), an audio panel, an attitude and heading reference system (AHRS), an air data computer (ADC) and the sensors and computers to process flight and engine information for display to the pilot. The system contains dual GPS receivers, dual VOR/ILS receivers, dual VHF communications transceivers, a transponder, and an integrated annunciation system to alert the pilot of certain abnormal conditions.

A remote avionic box is located behind the aft baggage compartment frame. A push-to-talk (PTT) button for the COM portion of the G1000 is mounted on the end of each control stick. There are connection facilities for up to 4 headsets between the front seats.

Refer to the Garmin G1000 Cockpit Reference Guide, P/N 190-00963-00 and Garmin G1000 Pilot's Guide for the Diamond DA 42 NG, P/N 190-00962-00 for complete descriptions of the G1000 system and operating procedures.

#### **NOTE**

Near the DME ground station, it can happen under certain adverse conditions that the Bendix/King KN 63 DME loses the direct signal from the ground station and locks onto an "echo". This will result in an inaccurate indication of the distance.

#### **NOTE**

During retraction and extension of the landing gear the ADF-indication may be inaccurate.

### **7.13.2 PRIMARY FLIGHT DISPLAY (PFD)**

The primary flight display (PFD; see figure below) typically displays airspeed, attitude, altitude, and heading information in a traditional format. Slip information is shown as a trapezoid under the bank pointer. One width of the trapezoid is equal to a one ball width slip. Rate of turn information is shown on the scale above the compass rose; full scale deflection is equal to a standard rate turn. The following controls are available on the PFD (clockwise from top right):

- \* Communications frequency volume and squelch knob
- \* Communications frequency set knobs
- \* Communications frequency transfer button
- \* Altimeter setting knob (baro set)
- \* Course knob
- \* Map range knob and cursor control
- \* FMS control buttons and knob
- \* PFD softkey buttons, including master warning/caution acknowledgment
- \* Altitude reference set knob
- \* Heading bug control
- \* Navigation frequency transfer button
- \* Navigation frequency set knobs
- \* Navigation frequency volume and identifier knob





The PFD displays the crew alerting (annunciator) system. When a warning or caution message is received, a warning or caution annunciator will flash on the PFD, accompanied by an aural tone. A warning is accompanied by a repeating tone, and a caution is accompanied by a single tone. Acknowledging the alert will cancel the flashing and provide a text description of the message. Refer to Chapter 3 - EMERGENCY PROCEDURES, Chapter 4B - ABNORMAL OPERATING PROCEDURES, and Section 7.10.3 - WARNING, CAUTION AND ADVISORY MESSAGES.

Advisory messages related to G1000 system status are shown in white and are accompanied by a white flashing ADVISORY alert. Refer to the G1000 Pilot's Guide and Cockpit Reference Guide for descriptions of the messages and recommended actions (if applicable).

Trend vectors are shown on the airspeed and altimeter displays as a magenta line predicting 6 seconds at the current rate. The turn rate indicator also functions as a trend indicator on the compass scale.

The PFD can be displayed in a composite format for emergency use by pressing the DISPLAY BACKUP button on the audio panel. In the composite mode, the full crew alerting function remains, but no map functions are available.

### **7.13.3 MULTI-FUNCTION DISPLAY (MFD)**

The multi-function display (MFD) typically displays engine data, maps, terrain, traffic and topography displays, and flight planning and progress information. The display unit is, nearly identical to the PFD and contains the same controls as previously listed. Additionally the MFD incorporates the controls for the autopilot system.

Engine instruments are displayed on the MFD. Discrete engine sensor information is processed by the Garmin engine airframe (GEA) sub-system. When an engine sensor indicates a value outside the normal operating range, the legend will turn yellow for caution range, and turn red and flash for warning range.

Also refer to Section 7.9.4 - ENGINE INSTRUMENTS.

#### **7.13.4 AUDIO PANEL**

The audio panel contains traditional transmitter and receiver selectors, as well as an integral intercom and marker beacon system. The marker beacon lights appear on the PFD. In addition, a clearance recorder records the last 2 ½ minutes of received audio. Lights above the selections indicate what selections are active. Pressing the red DISPLAY BACKUP button on the audio panel causes both the PFD and MFD to display a composite mode.

#### **7.13.5 ATTITUDE AND HEADING REFERENCE SYSTEM (AHRS)**

The attitude and heading reference system (AHRS) uses GPS, rate sensors, air data, and magnetic variation to determine pitch and roll attitude, sideslip and heading. Operation is possible in a degraded mode if the system loses any of these inputs. Status messages alert the crew of the loss of any of these inputs. The AHRS will align while the airplane is in motion, but will align quicker if the wings are kept level during the alignment process.

#### **7.13.6 AIR DATA COMPUTER (ADC)**

The air data computer (ADC) provides airspeed, altitude, vertical speed, and air temperature to the display system. In addition to the primary displays, this information is used by the FMS and TIS systems.

## **7.14 AVIONICS**

### **7.14.1 AUTOPILOT SYSTEM**

#### General

The GFC 700 automatic flight control system (AFCS) is a 3 axis autopilot and flight director system which provides the pilot with the following features: altitude preselect and altitude hold (ALT); yaw damper; flight level change with airspeed hold (FLC); vertical speed hold (VS); navigation tracking for VOR (NAV) and GPS (GPS); heading hold (HDG); approach mode and go around (GA) pitch/roll guidance. The system consists of autopilot controls on the multi-function display (MFD), servos with autopilot processing logic, flight director processing logic in the GIAs, a control stick-mounted elevator trim switch, a control stick mounted trim interrupt and autopilot disconnect switch, a control stick mounted CWS (control wheel steering) switch, a power lever mounted GA (go-around) switch, and PFD/MFD-mounted altitude preselect, heading, and course knobs.

The GFC 700 autopilot contains an electric pitch trim system which is used by the autopilot for automatic pitch trim during autopilot operation and by the pilot for manual electric pitch trim when the autopilot is not engaged. The manual electric pitch trim is operated by a split switch on the pilot's control stick.

The GFC 700 autopilot and manual electric trim (MET) will not operate until the system has satisfactorily completed a preflight test. The preflight test begins automatically with initial power application to the autopilot (AVIONIC MASTER switch is set to the ON position).

The following conditions will cause the autopilot to automatically disconnect:

- Electrical power failure
- Internal autopilot system failure
- AHRS malfunction
- Loss of air data computer information

The GFC 700 may be manually disconnected by any of the following means:

- Depressing the red AP DISC button on the pilot's or co-pilot's control stick
- Moving the left (outboard) side of the manual electric trim switch on the pilot's control stick
- Pushing the AP button on the autopilot mode controller when the autopilot is engaged
- Depressing the GA button on the left side of the power lever
- Pulling the AUTOPILOT circuit breaker
- Turning off the AVIONICS MASTER switch
- Turning off the ELECT. MASTER switch

In addition, the CWS (control wheel steering) switch on the pilot's control stick will disconnect the autopilot servos from the airplane flight controls as long as the CWS switch is depressed.

Power to the GFC 700 autopilot and electric trim system is supplied through the AVIONIC MASTER switch and the AUTOPILOT circuit breaker. The AVIONIC MASTER switch can be used as an additional means to disable the autopilot and electric trim system. The red AP DISC switch on the pilot's control stick will interrupt power to the manual electric trim for as long as the switch is depressed.

Loss of instruments or components of the G1000 system will affect the GFC 700 AFCS as follows:

- Loss of the AHRS will cause the autopilot to disconnect. The autopilot and flight director will be inoperative. Manual electric trim will be available.
- Loss of the heading function of the AHRS will result in loss of the HDG mode. If in HDG mode at the time heading is lost, the autopilot will revert to basic roll mode (ROL).

- Loss of the MFD will not cause the autopilot to disconnect, and will remain engaged with limited functionality, but the autopilot cannot be re-engaged after disconnect by the pilot.
- Loss of the PFD will cause the autopilot to disconnect. The autopilot and flight director will be inoperative. Manual electric trim will be available.
- Loss of air data computer information will cause the autopilot to disconnect. The autopilot will be inoperative. The flight director will be available except for air data modes (ALT, VS, FLC). Manual electric trim is available.
- Loss of GIA #1 will cause the autopilot to disconnect. The autopilot, flight director and manual electric trim will be inoperative. Loss of GIA #2 will also prevent autopilot and manual electric trim operation, but flight director will be available.
- Loss of the standby airspeed indicator, standby attitude indicator, standby altimeter, or compass will have no effect on the autopilot.
- Loss of both GPS systems will cause the autopilot and flight director to operate in NAV modes (LOC, BC, VOR, VAPP) with reduced accuracy. Course intercept and station crossing performance may be improved by executing intercepts and station crossings in HDG mode, then reselecting NAV mode.

The GFC 700 automatic flight control system (AFCS) installed in the Diamond DA 42 NG consists of the following components:

- One GDU which contains the following mode control buttons:
  - AP (Autopilot engage/disengage)
  - FD (Flight director on/off)
  - HDG (Heading mode on/off)
  - NAV (Nav mode on/off)
  - APR (Approach mode on/off)

ALT (Altitude hold mode on/off)

VS (Vertical speed mode on/off)

FLC (Flight level change mode on/off)

NOSE UP and NOSE DN (Vertical mode reference change)

YD (Yaw damper on/off)

This GDU is installed as the MFD.

- Servos with autopilot processing logic in the pitch, roll, yaw and pitch trim control systems
- Servo mounts and brackets
- Flight director processing logic in the GIAs
- Control stick-mounted manual electric trim (MET) switch (split switch) for pitch trim
- Control stick-mounted trim interrupt and autopilot disconnect switch
- Control stick-mounted CWS (control wheel steering) switch
- Remote-mounted go-around switch (on the left side of the power lever knob)
- PFD/MFD mounted altitude preselect knob (ALT)
- PFD/MFD mounted heading select knob (HDG)

Flight director commands and autopilot modes are displayed on the PFD. Full AFCS functionality is only available with both displays operating, and will disconnect under certain reversionary conditions.

Upon initial system power-up, the system undergoes a preflight test. At the end of the test, the autopilot disconnect tone sounds and the PFT and AFCS annunciations are removed. Successful completion of the preflight test is required for the autopilot and manual electric trim to engage.

Annunciation of the flight director and autopilot modes is shown in the lower status field of the PFD. In general, green indicates active modes and white indicates armed modes. When a mode is directly selected by the pilot, no flashing of the mode will occur. When automatic mode changes occur, they will be annunciated with a flashing annunciation of the new mode for ten seconds in green. If a mode becomes unavailable for whatever reason, the mode will flash for ten seconds in yellow and be replaced by the new mode in green.

Normal autopilot disconnects are annunciated with a yellow flashing AP on the PFD accompanied by a two second autopilot disconnect tone. Normal disconnects are those initiated by the pilot with the AP DISC switch, the MET switch, the AP button on the MFD mode controller, or the GA button. Abnormal disconnects will be accompanied by a red flashing AP on the PFD accompanied by a continuous autopilot disconnect tone. The disconnect tone and flashing alert may be cancelled by pressing the AP DISC switch or the left side of the MET switch.

Refer to the Garmin G1000 Cockpit Reference Guide, P/N 190-00963-00, and Garmin G1000 Pilot's Guide for the Diamond DA 42 NG, P/N 190-00962-00, for complete descriptions of the G1000 system and operating procedures.

### Power Supply

The AVIONIC MASTER switch supplies power to the avionics bus bar of the radio circuit breakers and the autopilot circuit breaker.

The following circuit breaker is used to protect the following element of the GFC 700 autopilot:

Circuit Breaker	Function
AUTOPILOT	Supplies power to the autopilot pitch, roll, yaw and pitch trim servos.

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## **7.14.2 AUTOMATIC FLIGHT CONTROL SYSTEM ANNUNCIATIONS AND ALERTS**

### Automatic Flight Control System (AFCS) Status Alerts

The following annunciations can appear on the PFD above the airspeed and attitude indicators. Only one annunciation occurs at a time, and messages are prioritized by criticality.

### Warning Alerts on the Automatic Flight Control System (AFCS)

<b>Warning alerts</b>	<b>Meaning / Cause</b>
PFT	PREFLIGHT TEST - Preflight system test failed; aural alert sounds at failure.
AFCS	SYSTEM FAILURE - AP and MET are unavailable; FD may still be available.
PTCH	PITCH FAILURE - Pitch axis control failure; AP inoperative.
ROL	ROLL FAILURE - Roll axis control failure; AP inoperative.
YAW	YAW DAMPER FAILURE - Yaw damper control failure; AP inoperative.
PTRM	PITCH TRIM FAILURE (or stuck AP TRIM switch) - if AP engaged, take control of the airplane and disengage AP. If AP disengaged, move AP TRIM switches separately to release.

Caution Alerts on the Automatic Flight Control System (AFCS)

Caution alerts	Meaning / Cause
↑ELE	ELEVATOR MISTRIM UP - Pitch servo providing sustained force in the indicated direction.
↓ELE	ELEVATOR MISTRIM DOWN - Pitch servo providing sustained force in the indicated direction.
←AIL	AILERON MISTRIM LEFT - Roll servo providing sustained force in indicated direction.
AIL→	AILERON MISTRIM RIGHT - Roll servo providing sustained force in indicated direction.
←RUD	RUDDER MISTRIM LEFT - Yaw servo providing sustained force in the indicated direction.
RUD→	RUDDER MISTRIM RIGHT - Yaw servo providing sustained force in the indicated direction.

Advisory Alerts on the Automatic Flight Control System (AFCS)

Advisory alerts	Meaning / Cause
PFT	PREFLIGHT TEST - Performing preflight system test; aural alert sounds at completion. Do not press the AP DISC switch during servo power-up and preflight system tests as this may cause the preflight system test to fail or never to start (if servos fail their power-up tests). Power must be cycled to the servos to remedy the situation.

## CHAPTER 8

# AIRPLANE HANDLING, CARE AND MAINTENANCE

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## **8.1 INTRODUCTION**

Chapter 8 contains the manufacturer's recommended procedures for proper ground handling and servicing of the airplane. The Airplane Maintenance Manual (Doc. No. 7.02.15) lists certain inspection and maintenance requirements which must be followed if the airplane is to retain a new plane performance and reliability.

## **8.2 AIRPLANE INSPECTION INTERVALS**

Inspections are scheduled every 50, 100, 200, 1000 and 2000 hours. Independent of the flight hours an annual inspection must be performed every year. A non-recurring engine inspection must be performed on new engines after 3 to 6 hours. The respective inspection checklists are prescribed in the Airplane Maintenance Manual, Chapter 05.

For maintenance work on engine and propeller, the currently effective Operator's Manuals, Service Instructions, Service Letters and Service Bulletins of Austro Engine and mt-Propeller must be followed. For airframe inspections, the currently effective checklists/manuals, Service Bulletins and Service Instructions of the manufacturer must be followed.

### **CAUTION**

Unscheduled maintenance checks are required after:

- hard landings
- propeller strike
- engine fire
- lightning strike
- occurrence of other malfunctions and damage

Unscheduled maintenance checks are described in the Airplane Maintenance Manual (Doc. No. 7.02.15; Section 05-50).

### **8.3 AIRPLANE ALTERATIONS OR REPAIRS**

Alterations or repairs to the airplane may be carried out only according to the Airplane Maintenance Manual, Doc. No. 7.02.15, and only by authorized personnel.

### **8.4 SERVICING**

#### **8.4.1 REFUELING**

#### **WARNING**

Do not allow fire, sparks or heat near fuel. Fuel burns violently and can cause injury to persons and damage to the airplane.

#### **WARNING**

Do not get fuel on your skin. Fuel can cause skin disease.

#### **WARNING**

Connect the airplane and the fuel supply vehicle to electrical ground before refueling. If you do not ground the airplane, static electricity can cause fire during refueling.

#### **WARNING**

Make sure that a suitable fire extinguisher is available at all times during refueling.

#### **WARNING**

Turn off all ground equipment in the refueling area.

#### **WARNING**

Do not operate electrical switches in the airplane during refueling.

## CAUTION

Use only approved fuel types given in Chapter 2.

1. Ground the airplane and the fuel supply vehicle electrically.
2. Remove the fuel filler cap (located on top of the outer wing). Check cap retaining cable for damage.
3. Refuel the airplane.
4. Install the fuel filler cap.
5. Repeat steps 2 to 4 for the other wing.
6. Remove the ground cable from the airplane and the fuel supply vehicle.

### **8.4.2 ENGINE OIL LEVEL CHECK**

1. Open the inspection door on top of the upper left cowling.
2. Remove the filler cap.
3. Clean the oil dip-stick.
4. Install the filler cap.
5. Remove the filler cap again.
6. Read the oil level from the dip-stick.
7. If necessary, add engine oil and repeat steps 3 to 6.
8. Install the filler cap.
9. Close the inspection door.
10. Repeat steps 1 to 9 for the other engine.

### **8.4.3 GEARBOX OIL LEVEL CHECK**

1. Open the inspection door on the forward left side of the lower cowling.
2. Check gearbox oil level in inspection window.
3. Close the inspection door.
4. Repeat steps 1 to 3 for the other engine.

**8.4.4 TIRE INFLATION PRESSURE CHECK**

1. Remove dust cap from valve stem by turning counterclockwise.
2. Connect tire gauge to valve stem, read pressure.
3. Correct pressure if necessary (nose tire 6.0 bar/87 psi, main tires 4.7 bar/68 psi).
4. Install dust cap on valve stem by turning clockwise.

## 8.5 GROUND HANDLING / ROAD TRANSPORT

### 8.5.1 GROUND HANDLING

For pushing or pulling the airplane on the ground, it is recommended to use the tow bar which is available from the manufacturer. The tow bar is engaged in the appropriate hole in the nose wheel as shown on the picture.



Tow bar

### **WARNING**

The tow bar must be removed before starting the engine.

### **CAUTION**

The tow bar may only be used for moving the airplane on the ground by hand. After moving the airplane, the tow bar must be removed.



**CAUTION**

Towing with towing vehicles is not approved.

**NOTE**

If the engine is not used for more than 4 weeks an engine ground run must be performed. Refer to AE Operation Manual, Doc. No. E4.01.01, latest revision.

**8.5.2 PARKING**

For short term parking, the airplane must be positioned into the wind, the parking brake must be engaged and the wing flaps must be in the retracted position. For extended and unattended parking, as well as in unpredictable wind conditions, the airplane must be anchored to the ground or placed in a hangar. Parking in a hangar is recommended.

**Control surfaces gust lock**

The manufacturer offers a control surfaces gust lock which can be used to block the primary controls. It is recommended that the control surfaces gust lock be used when parking outdoors, because otherwise the control surfaces can hit the stops in strong tail wind. This can lead to excessive wear or damage.

**WARNING**

The control surfaces gust lock must be removed before flight.

The control surfaces gust lock is installed as follows:

1. Move the rudder pedals fully forward.
2. Engage the control surfaces gustlock with the pedals.
3. Engage the stick, wrap straps around stick once.
4. Attach the locks and tighten the straps.

For removal reverse the sequence.



**8.5.3 MOORING**

Near the lower end of the tail fin of the airplane there is a hole which can be used to tie down the airplane to the ground. Also on each wing near the wing tip, an eyelet with a metric M8 thread can be installed and used as tie-down points.

**8.5.4 JACKING**

The airplane can be jacked at the two jackpoints located on the lower side of the center wing's LH and RH root ribs as well as at the tail fin.

## **8.6 CLEANING AND CARE**

### **CAUTION**

The airplane must be kept clean. The bright surface prevents the structure from overheating.

### **CAUTION**

Excessive dirt deteriorates the flight performance.

#### **8.6.1 PAINTED SURFACES**

The entire surface of the airplane is painted with a white weatherproof two component paint. Nevertheless, it is recommended to protect the airplane against moisture and dampness. It is also recommended not to store the airplane outside for long periods of time.

Dirt, insects, etc. can be removed with water alone and if necessary with a mild detergent. An automotive paint cleaner can be used for stubborn spots. For best results, clean the airplane after the day's flying is ended, so that the dirt will not become ingrained.

Oil stains, exhaust stains, etc. on the lower fuselage skin can be removed with a cold detergent. Before starting, ensure that the detergent does not affect the surface finish. Use commercial automotive preservatives without silicone additives to conserve the paint finish.

### **8.6.2 CANOPY AND REAR DOOR**

The canopy, rear door and rear window should be cleaned with 'Plexiklar' or any other acrylic glass detergent if available; otherwise use lukewarm water. Final cleaning should be carried out with a clean piece of chamois leather or soft cloth. Never rub or polish dry acrylic glass.

### **8.6.3 PROPELLER**

Damage and malfunctions during operation must be inspected by authorized personnel.

#### Surface

The manufacturer uses PU paint or acrylic paint which is resistant to almost any solvent. The blades may be treated with commercial automotive cleaning agents or preservatives. The penetration of moisture into the wooden core must be avoided by all means. Should doubts arise, an appropriately rated inspector must be consulted.

### **8.6.4 ENGINE**

Engine cleaning is part of the scheduled inspections.

### **8.6.5 INTERIOR SURFACES**

The interior should be cleaned using a vacuum cleaner. All loose items (pens, bags etc.) should be removed or properly stored and secured.

All instruments can be cleaned using a soft dry cloth. Plastic surfaces should be wiped clean using a damp cloth without any cleaning agents.

The leather interior should be treated with leather sealer within 3 months since new, and then at intervals of 3 to 6 months. Clean the leather interior with an appropriate mild leather cleaning agent and a soft cleaning brush for leather.

Note that the acrylic glass windows transmit the ultraviolet radiation from the sun.

## **8.7 GROUND DE-ICING**

Approved deicing fluids are:

<b>Manufacturer</b>	<b>Name</b>
Kilfrost	TKS 80
Aeroshell	Compound 07
	AL-5 (DTD 406B)

1. Remove any snow from the airplane using a soft brush.
2. Spray deicing fluid onto ice-covered surfaces using a suitable spray bottle.
3. Use a soft piece of cloth to wipe the airplane dry.

## CHAPTER 9

# SUPPLEMENTS

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## 9.1 INTRODUCTION

Chapter 9 contains information concerning additional (optional) equipment of the DA 42 NG.

Unless otherwise stated, the procedures given in the Supplements must be applied in addition to the procedures given in the main part of the Airplane Flight Manual.

All approved supplements are listed in the List of Supplements in this Chapter.

The Airplane Flight Manual contains exactly those Supplements which correspond to the installed equipment according to the Equipment Inventory of Section 6.5.

## 9.2 LIST OF SUPPLEMENTS

Airplane S/N:		Registration:		Date:	
Sup. No.	Title	Rev. No.	Date	applicable	
				YES	NO
S02	Ice Protection System	0	18-Feb-2009	<input type="checkbox"/>	<input type="checkbox"/>
S04	Continuous Flow Oxygen System	0	18-Feb-2009	<input type="checkbox"/>	<input type="checkbox"/>

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